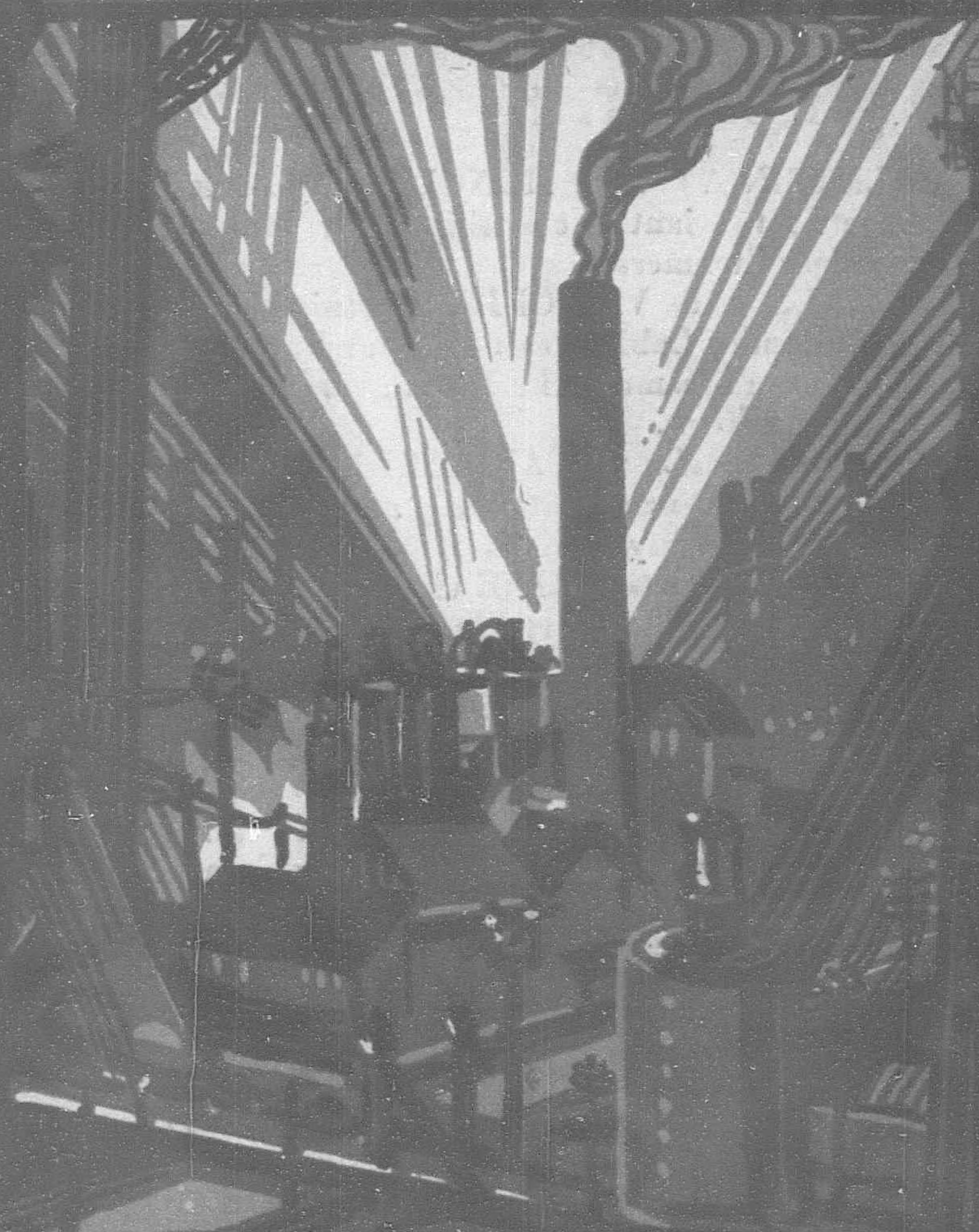


FAR EASTERN REVIEW



THE VALIDITY OF A TREATY
CHINESE SOLDIERS
A STRAW IN THE WIND
Bronson Rea Made Advisor

上海黃浦灘念四號

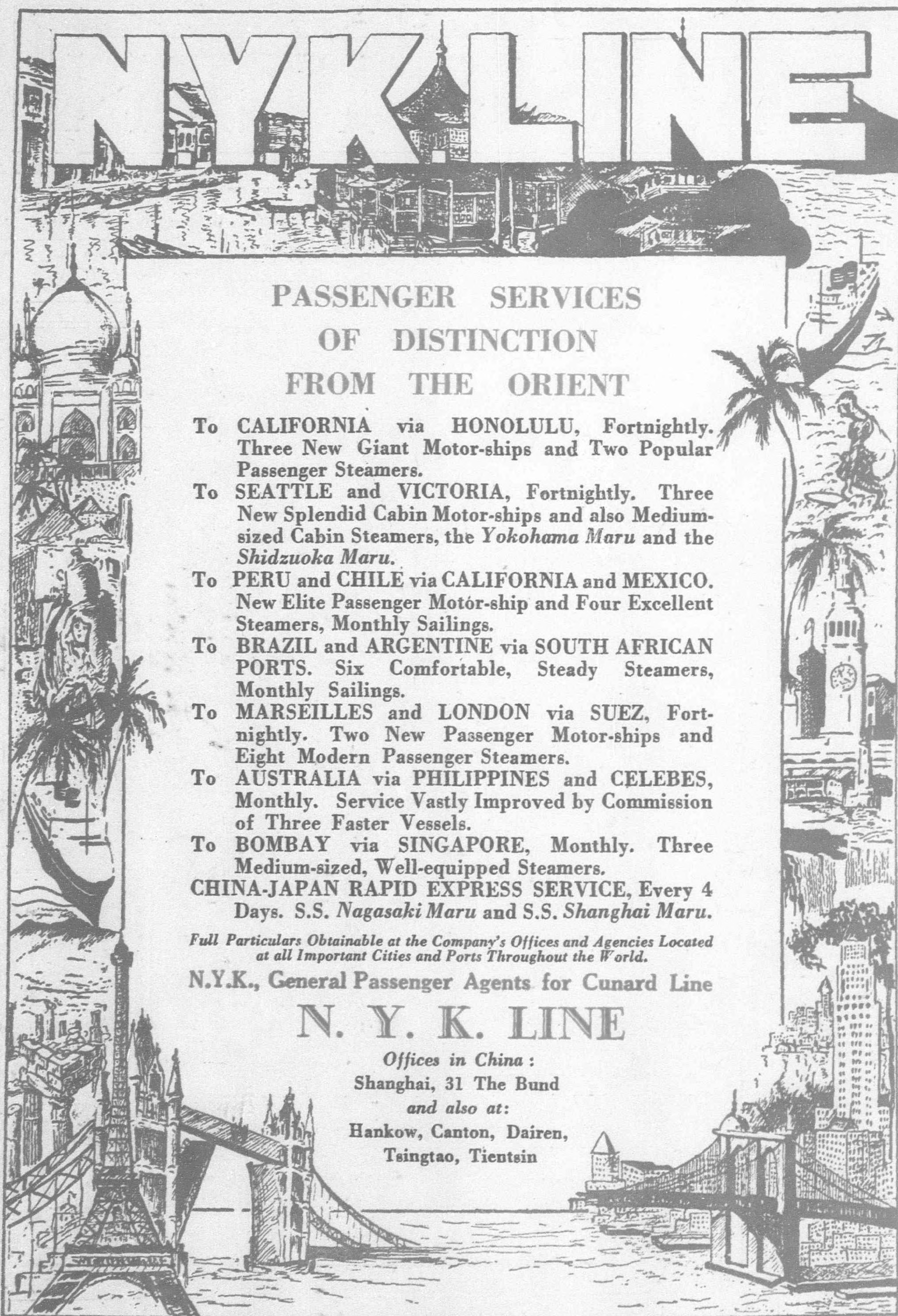
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No. 7

NYK LINE

The background of the advertisement features a detailed illustration of a harbor scene. At the top, a large ship is docked at a pier. Below it, various buildings, including a prominent domed structure, are visible. The water is filled with smaller boats and ships. The overall style is that of a classic maritime travel poster.

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ENGINEERING

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The Validity of a Treaty

Back to the Starting Point. China's Determination to Compel International Intervention in a Dispute over the 1915 Treaty and Wreck the League

By GEORGE BRONSON REA

"The flagrant breach of international agreements and undertakings by Japan and her puppets is of the gravest concern to the world and if the Dairen customs revenues are seized by the Manchukuo Government, China's international credit and solvency will be seriously impaired. . . . China cannot agree to any settlement on a compromise measure in the Customs or other issues which would impair her sovereignty and her political and administrative integrity and, if China goes bankrupt, Japan must assume full responsibility," declares the Nanking Government.

The Manchurian customs dispute simmers down to a question of some 19,000,000 Haikwan Taels (at the present rate of exchange about \$6,000,000 gold) yet the Nanking Minister of Finance says that the loss of this revenue will cause a financial catastrophe of the first magnitude with world-wide repercussions. He then calls upon the friendly Powers to save the security for their loans and their loans in arrears.

As we read the clamorous entreaties of Nanking our mind goes back to the defiant Chinese proclamations severing economic relations with Japan in order to bring about her financial ruin. That procedure was perfectly proper, strictly legitimate and within the treaties. Japan's protests, denunciation of the boycott as an act of war and efforts to bring the question up for discussion, went unheeded. The jubilant Chinese thought that there could be no come-back to this type of warfare; that they had Japan on the run; that she could not defend herself and, that it was only a question of time when the Island Empire would be plunged into chaos and bankruptcy. We do not recall that there was any sympathy wasted on Japan. Not until she freed herself from this slow strangulation, did other nations sense the menace to world peace involved in China's resort to war within the Peace Pacts.

The shoe is now on the other foot. The Nationalist Government, which incited the boycotts against Japan in order to support its revolutionary diplomacy has reached the end of its financial tether. After pledging every cent of the increased customs revenues as security for its domestic war loans, Nanking now faces the catastrophe it sought by all means within its power to visit upon Japan. Yet the foreign loans secured on the Customs revenues are in no immediate danger of default. The hardship, if any, falls upon the holders of Chinese domestic bonds whose value has already depreciated to the point where further transactions and quotations on the stock exchange have been prohibited by ministerial order. As long as the noose was being drawn tighter and tighter around Japan's neck, her efforts to free herself were greeted with objugation and derision. Now that Japan has cut through the hangman's knot with her sword and in turn presented China with a silken cord, the laughter has changed to cries of dismay and wails for help.

* * * *

The Dairen Customs dispute brings us back to the root cause of all the recent troubles in the Far East, to the basic issue between China and Japan arising out of the validity of the 1915 Treaty. If valid, Japan is legally bound by its provisions and the stipulations

of the supplementary customs agreement. If invalid, China has no rights in the premises that cannot be upheld by force. The original lease to the Liaotung Peninsula signed in 1898 was for a period of twenty-five years. The 1907 Dairen Customs Agreement is conditional on and expires with the lease. In 1915, China and Japan signed a treaty extending the lease to ninety-nine years, automatically extending the Dairen Customs Agreement for a like period. China, however, declared the 1915 Treaty null and void and refused to be bound by its provisions. As far as China is concerned, the 1915 Treaty does not exist. To enforce her viewpoint, she has resorted to every means short of actual warfare. Now if the 1915 Treaty is invalid, the Dairen Customs Agreement is also invalid and China is debarred from raising the subsidiary question while the major issue remains unsettled.

A purely supplementary agreement defined in its preamble as a "preliminary and provisional measure" for the purpose of facilitating the collection of the Chinese maritime customs at the port of Dairen instead of at Wafangtien on the frontier of the Leased Territory, and which derives its sanctions and duration from the convention for the lease of the Liaotung Peninsula, automatically lapses with the termination of the lease. When a subsequent treaty extending the lease to ninety-nine years is declared null and void by one of the parties, the customs agreement must perforce be also null and void and without binding power upon the other party. If China now contends that the customs agreement is binding, she admits that the treaty from which it proceeds is also valid and binding and stands self-convicted of having wilfully jeopardized the peace of the world in order to attain her ends.

Since the date of its signature, China has refused to recognize the 1915 Treaty and has moved heaven and earth to carry her viewpoint. She converted the Versailles and Washington Conferences into tribunals for the trial of Japan over the validity of this treaty and reserved to herself the right to raise the issue on every future appropriate occasion. In 1923, on the expiration of the original lease, she officially called upon Japan to evacuate Kwantung and has since waged a continuous provocative publicity campaign and ruinous economic warfare to support and enforce her diplomacy. When Japan retaliated in self-defense, she rejected direct negotiations and threw her whole case unreservedly into the League, with the full knowledge that if a treaty extracted under duress came under its purview, the precedent would be established for its undoing. As it is, China has almost disrupted the League, estranged the United States and Japan and nearly precipitated a world boycott and war in order to carry her point.

The Basic Factor

It is perhaps best for the peace of the world and the prestige of the League that the rapid march of events has completely modified a dispute the League Mission was dispatched to the Far East to inquire into. For, had the case between China and Japan been confined to its original legal aspects, the League could not have side-stepped the fundamental cause of the dispute, nor escaped

rendering a decision as to the validity of the 1915 Treaty. No solution, plan of conciliation or even a basis for negotiation was possible without a clear cut decision on this point, around which and from which proceeded all the other incidents which led up to the night of September 18 last. Had the League reviewed the legalities of the case and accepted jurisdiction in the settlement of this point, it would have created a precedent for the revision of all other treaties in which the weaker or defeated nation consents to cessions of its territory or other rights of importance. The Versailles treaty itself would be assailed by every nation suffering from its provisions and the League would have been called upon to officiate as its own undertaker.

China has no real interest or sympathy with the League. She stands indicted in the records of having attempted to knife it in the back at its birth. Disappointed over her failure to bring up the Manchurian question at the Paris Conference and enraged over the Shantung award, the Chinese Delegation refused to sign the Versailles Treaty and dispatched a paid emissary to Washington with instructions to "*break the Treaty in the Senate.*" The evidence to this effect is recorded in the hearings before the Senate Foreign Relations Committee. This agent utilized the occasion to openly advocate war between the United States and Japan. China deliberately took advantage of a purely domestic political fight between the Republican Senators and President Wilson to fish in troubled waters and reinforce the hands of those opposed in principle to America's entering the League. The injection of the Shantung award into this exclusively American controversy assured defeat of the treaty. The United States did not become a Member State of the League and this body, created by an American President with such high hopes for its future usefulness, was crippled at its birth. China, however, crept into the League through the side door of the Austrian Treaty and now arrogantly demands a permanent seat on its Council as her right. She cannot, however, shirk her responsibility for an act that emasculated the League and rendered its decisions of doubtful value unless concurred in by the United States.

It is appropriate at this late date to invite attention to this chapter in the League's early history, in order to appreciate fully the general attitude of China towards this instrument for world peace. As she had no scruples about strangling the League at its conception, she now has no principles about inflicting the *coup de grace* that will end its short-lived career. China defiantly has declared to the world that she will never confront Japan alone for an amicable compounding of these disputes, insisting with all the force of her diplomacy and propaganda that they can be settled only in full purview of all the interested Powers.

An Opportunity That Passed

At any time within the last ten years, China could have settled these questions and averted what has befallen her, by simply acknowledging the facts of history and recognizing the 1915 Treaty as part payment of her debt to Japan for restoring her lost sovereignty over Manchuria in 1905. For China to win the good-will and everlasting friendship of Japan, she had only to express regret for the existence of the secret Li-Lobanoff treaty of alliance which, on its face, provoked and made possible the Russo-Japanese war and thank Japan for her intervention and sacrifices which restored the Three Eastern Provinces to her rule after they had been virtually annexed by Russia and closed to foreign trade, travel and residence.

The proof of the existence of this treaty was supplied by China herself at the Washington Conference by filing first the incomplete telegraphic summary and subsequently the full official text, which clearly denotes hostility and aggression against Japan and reveals that the Chinese Eastern and South Manchurian railways were primarily strategic lines to facilitate the transport and movement of the Russian armies in preparation for the war of revenge against Japan that influenced Li Hung-chang in selling his country's birthright. There is no escaping the real significance and object of that secret treaty nor the fact that China fully complied with her part of the contract in handing over her territory so that Russia could be placed in a more favorable position to crush Japan. It stands as the most cynical and vicious example of pre-war secret diplomacy that as yet has been revealed to a wondering world. Had Japan known, or even suspected the existence of this treaty in 1905, she rightly could have demanded as a legitimate indemnity from China, the cession in perpetuity of the whole of South Manchuria and cash to boot. Germany and the Central Powers were carved up for much less than this. But after publicly

confessing the existence of and releasing the official text of the treaty, China has stubbornly refused to admit its importance or bearing on subsequent events. It is simply another instance of a treaty China confesses to having signed but for which she declines to accept responsibility.

No official Chinese document makes any reference to this Master Key to the problems of the Far East. On the contrary, its importance is studiously ignored and concealed, the Chinese stating and resting their case on what followed after Portsmouth, throwing upon Japan the sole blame for the conflict and insisting that her purpose has been to seize Manchuria whenever an opportune occasion arises. It is obvious that China dares not mention or stress the importance of this secret treaty without inviting the collapse of her case against Japan. For, if the 1915 Treaty is invalid, then Japan's rights in Manchuria must be defined by the provisions of the Portsmouth Peace Treaty. Should the case have been tried before an international tribunal and re-examined in the light of China's confession at Washington, Japan would still have the legal right to demand the payment of the indemnity she was tricked out of at Portsmouth by reason of the profound secret surrounding the existence of the alliance between China and Russia. To review the events leading up to the signing of the Manchurian Treaty of 1915, would open up the whole case and, as there is no statute of limitations to the acts of a nation, China could not escape being called to account for her sinister secret diplomacy which plunged the Far East into what up to that time, was the most bloody and terrific conflict of the century.

As China provoked the war of 1905 and escaped the consequences by concealing the existence of the secret treaty of alliance with Russia, she has also sought to evade responsibility for her acts subsequent to the Peace of Portsmouth. With the record of her double-dealing filed in the archives of the Washington Conference, China now shamelessly declares that she had never any doubt that Japan intended to seize Manchuria, and endeavors to invalidate her 1905 agreements with Japan by charging she was coerced into implementing the latter's gains from Russia making a special point in denying the existence of a secret protocol to the Peking Treaty (in which China transferred to Japan the Russian rights in Manchuria) prohibiting the construction of parallel lines in the vicinity of the South Manchuria Railway. One of her legal advisers has even declared before an American audience that this clause is a downright forgery.

Officially, the Chinese Government still insist that the prohibitory clause does not exist. It was not until the League Mission of Inquiry visited Tokyo that the Japanese Government furnished its members with a photostat copy of the initialled Minutes, that China's contention was disproved. Yet, the records disclose that the same restrictions were incorporated in the American concession for the Canton-Hankow Railway and in the British loan agreement for the Shanghai-Nanking Railway, both signed previous to the 1905 Sino-Japanese negotiations at Peking. What China conceded voluntarily to American and British corporations as a necessary safeguard for their investments, became a coercion, a violation of the Open Door, of the Portsmouth Treaty, an impairment of her sovereignty, in fact, an aggression that all other Powers should defend her against, when proposed by Japan to protect her similar railway rights in Manchuria.

How China Plays Safe

China also makes the point to the League that the Twenty-One Demands were accompanied by an ultimatum expressing clear intention to use armed force if the demands were not complied with, yet her own records of the conferences reveal that the demands concerning Manchuria were conceded without serious opposition. Chinese diplomats and publicists refuse to comment on the evidence that the ultimatum was presented by Japan on their own solicitation in order to expedite the signing of the treaty and to save their "face" before their own people. Although no official record exists to support this statement, there is ample corroboration in the testimony of responsible Japanese statesmen that China on her own initiative requested the ultimatum. Here, again, China studiously ignores evidence, which if established and admitted throws her whole case against Japan out of court. Her contention that the 1915 Treaty is invalid rests squarely upon the truth of this statement which refutes her testimony concerning the presentation of an ultimatum justifying her claim that the treaty was extracted "under duress." Yet it can be proved by competent witnesses

that the much denounced ultimatum was merely a shadow play on Japan's part to satisfy the Chinese idea of "face." So again, we arrive at the conclusion that China will conceal and ignore essential evidence and resort to any means or measures to carry her point. Only when the Nanking régime is confronted with the loss of a few million dollars in revenues, does it admit by implication that the much disputed 1915 Treaty is valid and binding!

It is a sordid picture. Nanking seemingly cares little for the peace of the world, or for the expense that the League and the United States might be put to through actual warfare or the application of economic sanctions against Japan, so long as the customs revenues from Manchuria are paid into its treasury. The Chinese hailed with great joy the prospect that Japan might be boycotted and ruined and redoubled their propaganda to precipitate a world débâcle in which they had nothing to lose and everything to gain. China's tardy admission that the Dairen Customs Agreement is binding and by implication that the 1915 Treaty is also valid and binding, exposes her to the charge of wilfully hoaxing the world and of defeating all efforts of the League Mission of Inquiry to find a solution to a dispute originating in her denunciation of this treaty.

* * * *

There seems to exist a legitimate conflict of opinion as to whether the Chinese Government has officially declared the 1915 Treaty null and void. Dr. C. Walter Young, Legal Adviser to the League Mission of Inquiry, in his recent work on "The International Legal Status of the Kwantung Leased Territory" says:

"The Chinese Government has not officially maintained the position that the period of Japan's lease actually terminated in 1923. This may be surprising to some, but the import of this statement is clarified by the assertion that the Chinese Government, neither at the Paris Peace Conference, nor at the Washington Conference, nor in the communication to the Japanese Government in March, 1923, actually declared that they would not in future be bound to observe Japan's authority in Kwantung. What the Chinese Government have officially done is to declare two things, first, that the treaties and notes of 1915 exist but should be abrogated, and second, that China reserves the right to open the question whenever she believes an opportune moment has come for doing so. Both of these declarations are of practical legal significance."

In effect, Dr. Young's interpretation of the Chinese official position is that the 1915 Treaty is not void, but voidable. Opposed to this opinion, is the official statement communicated by the Chinese Delegation to the Council and Members of the League of Nations on February 29, 1932 (the last official utterance of the Chinese Government on the dispute) which reads:

"The 1915 dictated 'Agreements' cannot be read as a whole with an eye to their cumulative effect without arriving at the conclusion that they were intended to lead to, if not actually establish, a virtual protectorate over that part of China which they concerned. The Chinese Government and people have characterized them as invalid and of no effect. . . . Finally, it should be pointed out that the 1915 so-called 'Agreements' have never been ratified by the Chinese Parliament as the Constitution of the Republic requires. On the contrary, the Parliament, in January, 1923, mindful of the approaching expiration of the original lease of Port Arthur and Dalny, adopted a resolution formally declaring the Treaties of 1915 null and calling upon the Government to act accordingly."

The use of quotation marks and the words "so-called," in addition to the action of the Chinese Parliament in formally declaring the treaty null and void, clearly defines the position of the Chinese Government on the status of the Kwantung Lease. China's official statement presented to the League must therefore be accepted as defining her conception of the 1915 Treaty, a position which can be upheld only by superior military force on her part, failing which, by concerted armed action on the part of other interested Powers or the League itself. Japan has declared on many occasions that she will brook no outside interference with her rights in Manchuria. If needs be, she will fight and go down to defeat and extinction as a nation before she will recede from this position. With a full understanding of Japan's unalterable resolve to adhere to this declared policy and unable to face her alone, China was equally determined to precipitate an issue that would throw the dispute into the League

of Nations and force an intervention that under the circumstances could only terminate in a world war.

The Course of Events

It is useless at this late date to review China's long drawn out campaign of provocation which culminated on the night of September 18 of last year. In every way, China forced the issue in accordance with her proclaimed intention at the Washington Conference. As to the rights and wrongs of the case, it is too late to discuss them. We are facing a condition, not a theory. China had her chance to negotiate with Japan but rejected all overtures from the latter to meet in conference for a settlement of various minor phases of the major dispute. China went so far as to declare that no new treaty of commerce and amity could be negotiated with Japan until the latter evacuated the Leased Territory and withdraw her railway guards from Manchuria. The issue was clear cut. China threw the gauntlet in Japan's face and when the latter struck back in self-defense, ran to Geneva for sanctuary in accordance with her fixed and declared purpose to force international intervention in a dispute she had resolved never to discuss with Japan alone.

Any dispassionate review of events subsequent to the Sino-Japanese war of 1895, will reveal that China has never admitted her defeat at the hands of Japan. She ceded in perpetuity the southern part of Fengtien province to Japan and then accepted as the right of the victor, retrocession of the territory through the intervention of Russia, France and Germany. She immediately entered into a secret treaty with Russia and handed over to her ally the whole of Manchuria in order to be revenged upon Japan and when to her amazement Russia was defeated and forced to cede the Liaotung Peninsula and the railway rights in South Manchuria to Japan, China's fury and desperation found expression in a renewed campaign to deprive Japan of the precarious fruits of her victory. Dangling the bait of concessions and loans before American capitalists, the United States became for all practical political purposes, China's new ally against Japan. When all her scheming and plans to force international intervention in Manchuria failed, and in 1915, she was compelled to extend the Liaotung Lease to ninety-nine years China's humiliation at the hands of Japan was complete and she has never ceased from that date in her efforts to once more precipitate international intervention to make Japan surrender the legitimate fruits of her two victories.

The Paris and the Washington Conferences were converted into veritable diplomatic dog-fights due to China's insistence on raising the Manchurian issue. At all times, China has posed as the innocent and injured victim, denying or concealing the existence and importance of treaties and agreements or asserting she had been coerced into signing them and then appealing to the world for moral and material support against the imperialism and aggressions of Japan. China has never appealed for support against the aggressions of Russia, even when the latter lopped off Mongolia and added it to her system of Soviet republics. On the contrary, China invited Russia to intervene in her affairs and accepted its aid in establishing the government which now on bended knee frantically appeals to the world for protection against another nation whose existence has been jeopardized by the rapid sovietization of the country.

For all practical purposes the old secret alliance between China and Russia aimed at Japan still holds good. China, with her useless armies of three million men has never dared to go to war with Japan and hailed with secret joy every instrument for the preservation of world peace, knowing that once actual war was outlawed, she automatically became the foremost Power in the world and under cover of her boycotts and unilateral abrogation of treaties could defeat and ruin her adversary without firing a shot. The world unconsciously forged a terrible and pitiless weapon and permitted it to be wielded without restraint by China when it abolished war and failed to outlaw the boycott.

As far as China is concerned, she has no claim to sovereignty over the Kwantung Leased Territory except in so far as she can enforce it by a victorious war. By throwing her case into the League of Nations, she skilfully shifted this burden from her own shoulders on to other nations uninformed of the underlying facts of the dispute. The League and the United States were apparently ignorant of what they were being let in for. For, behind all the incidents which make up the Manchurian problem, loomed the all important and vital issue of the validity of the 1915 Treaty, whose

mere consideration by the League would have been fatal to its existence. Or, had the League accepted jurisdiction in the dispute and decided in favor of China, its verdict could be enforced only by another world war that would complete the ruin of Western civilization.

The Plight of the League

Viewed from any angle, China's refusal to settle the dispute by direct negotiation with Japan, meant disaster to the League, a contingency that China was fully apprised of by the confidential reports of her official advisers who clearly foresaw the dangers and complications arising from Geneva's consideration of a treaty extracted under duress that would serve as a precedent for a concerted assault upon the Versailles Treaty.

Had the League been less precipitate and enquired into the causes of the dispute instead of concentrating its attention on the consequences, it would have discerned the trap concealed behind China's invocation of the Covenant and her subsequent appeal to the Assembly. The League would never have committed itself to sending a mission to investigate on the ground a situation that had its origin in a disputed treaty that ante-dated the League itself and was recognized by all Powers other than the grantor, as valid and binding. This Mission, when it arrived in the Far East, did not take long to discover that the dispute could never be settled by approaching it from the legal end. In fact, it dared not tackle the problem from an angle committing the League to pass judgment upon the validity of a treaty extracted under duress and has limited the scope of its activities to reporting on conditions and seeking some basis of amicable adjustment by direct negotiation between the interested parties; a well-nigh hopeless and thankless job.

Japan was equally to blame with China for her tardiness in presenting the fundamental and vital point in the dispute. Had she rested her case at the very outset on China's refusal to recognize the 1915 Treaty; reviewing the latter's efforts to convert the Paris and Washington Conferences into tribunals for the settlement of this old dispute; inviting attention to China's declared and fixed policy to raise the issue on every opportune occasion; stressing the bearing of this treaty on other similar contracts and its direct relation to the validity of the Versailles Treaty and the Covenant; the League would have understood that China was again forcing international intervention in a dispute that was successfully side-stepped at Paris and Washington and left by common consent to the two interested parties to settle by direct negotiation. As it is, the League has been placed in a most embarrassing position, with no prospect of arriving at any equitable solution that will meet the approval of China or Japan. Its position at the outset, when the dispute was confined to two Member States, was clearly defined, and in creating a commission of inquiry to study conditions on the ground and report its findings and recommendations, it was doing the only thing reasonable and possible at the time to reach a peaceful adjustment within the Covenant. The Mission had every reason to hope and believe that it could find a solution that would uphold the prestige of the League, but these hopes were dispelled when Manchukuo declared its independence and the Japanese Government announced its decision to recognize the new state, when, in its opinion, it had qualified for such recognition. This clear cut announcement takes the matter out of the League and into the realms of international law.

* * *

The world may laugh and crack jokes about the status of Manchukuo. It may be a "puppet state," a "bogus government," a rebel against the authority of Nanking and its former overlord. It makes little difference what it is called. It remains a fact, a reality, and the government of the new state, supported by the decision of the Japanese army to maintain peace in its territory, will defend its independence by every means within its power.

Its cause does not depend upon the justice and morality of its secession from the rest of war and bandit-ridden China, but upon the actual establishment of its independence. The justice of its cause springs from the fundamental right of a people to rise in rebellion against oppression, injustice and misrule and set up a representative government of their own. It does not matter how the occasion was created; whether it was made possible by the military intervention of Japan in defense of its economic or strategic security; by the demise or removal of the despot and collapse of the bandit oligarchy; or by an Act of God. By hook or by

crook, by fair means or foul, the end justifies the means. Thirty million hard-working, home-loving, peaceful people struggling to create a new home in a new land, free from the intolerable conditions in China Proper, have been released from bondage to their taskmasters. For the first time in their long history they stand on their feet as human beings, facing the future with a new and brighter outlook and asking the world for that sympathy and recognition that is their unquestionable due. Manifest destiny is also at work in Asia.

Chinese in race, in spirit, in culture and in their traditions, the people of Manchukuo remain true to the civilization that binds them to others of their race, but they stand firmly on their inalienable right to secede from a government imposed from the outside and whose recognition by the Powers as representative of the whole, constitutes its sole right to intervene in their affairs.

The military dictatorships of Peking and the Kuomintang tyranny at Nanking have never exercised jurisdiction over Manchuria except on paper and in the text of treaties which other nations have drafted and subscribed to for the furtherance of their own special and selfish policies. Manchuria has always maintained its autonomy and independence, successfully resisting any attempt on the part of the Peking and Nanking régimes to impose their authority in regions outside the Wall. Had the Young Marshal not been led away by dreams of conquest and remained within his own bailiwick, Manchuria would never have become associated with Nanking and provided the latter with the excuse to interfere in its affairs through recognizing the Young Marshal as Vice Commander-in-Chief, or as he prefers to put it, "Co-Ruler of China." His insensate ambition to play the rôle of "Conqueror," led him to leave his home base in order to grasp an easy victory. In doing so he has lost his army and with it his hold over the slaves of Manchuria.

This is all there is to the story. The Young Marshal may still be the "Co-Ruler of China"; his henchmen may direct the diplomacy of Nanking and his representative may sit on the Council of the League of Nations, but unless his hard-pressed colleague in Nanking sends an army to his assistance or furnishes him with funds, his days are numbered.

The Blunders of the Young Marshal

The Young Marshal is an interloper in North China. He marched his armies into Peking when both sides in a disastrous civil war were exhausted and could offer no resistance. He made himself "Co-Ruler of China," occupied Peking and settled down to watch and wait for another easy opportunity to extend his sway, giving no heed to his rear and base of supplies and finances. In effect, the Young Marshal got out on the end of a limb and unwisely made faces and threw stones at the Japanese, who promptly sawed the limb off and let him drop into the middle of the pack of hungry wolves waiting to tear him to pieces for stealing away their living.

Chang Hsueh-liang will never be permitted by the Japanese army to return to Manchuria. His colleague at Nanking is too busy holding on to his own living and wondering where the money is coming from, to assist his Vice-Commander-in-Chief in reconquering Manchuria. In the meantime, Yen Shih-shan and the other hard-boiled militarists of North China whose territories and revenues he filched, are busily sharpening their swords. The Young Marshal is nearly finished. His only hope is that the good, old League of Nations or the United States will save his bacon by some action that will restore Manchuria to his rule. It is only a question of time when the scholarly Governor of Shansi; the fine, upstanding Christian General, the Grey Wolves of Honan, the Opportunist at Tsinanfu and others of the group he dispossessed, will undermine his position and force him to fly away in his great Ford plane to that heaven of all other ousted dictators, somewhere in France.

All that Japan and Manchukuo have to do is to keep the Young Marshal inside the Wall and Chinese politics will do the rest. If Japan and Manchukuo should desire to hasten his elimination or retaliate for his activities in stirring up discontent and strife in Manchukuo, they would not even have to send an army inside the Wall for this purpose. A few millions judiciously bestowed where they would do the most good and any one of a dozen disgruntled and vengeful Northern generals would gladly undertake the job of driving him from Peking in order to seat themselves in his place. This is good, sound and eminently respectable Chinese politics, the way the game has been played from time

immemorial. Chang will get a dose of his own medicine, handed to him by those who had to swallow the bitter draught when he prescribed the remedy and pressed the cup to their lips.

The elimination of Chang Hsueh-liang will be followed by the dispersion of his henchmen and hangers-on. Will Nanking take over this group and continue the fight to impose the Kuomintang yoke on the necks of an unwilling and racially hostile people? Can Nanking bring Manchukuo under its sway when it cannot hold its own in the Yangtze Valley or in South China? Will Geneva and Washington insist that the people of Manchukuo, of all provinces in China, forego their right to self-rule and accept an overlord appointed by Nanking, disguised as a High Commissioner or some other equally pompous and empty title in order to save the face of a Nanking war-lord and pave the way for him to insert the wedge of Kuomintang authority into a region which will have none of its doctrines?

There is no more love between the people of Manchuria and the people of South China than there is between any two widely separated and hostile racial groups in Europe. For the League to render a decision giving to Nanking the right to appoint a High Commissioner over Manchuria, would be like sending an Armenian to rule Belgium or handing over Germany to the mandate of Roumania. No province in China Proper could ever by itself enforce its rule in regions north of the Wall. That Manchuria was for the moment nominally under the rule of Nanking, was simply one of those extraordinary make-believe Chinese political farces meant to save everybody's face, made possible solely by the easy invasion of North China by the budding Napoleon of Mukden; a strategic move to protect himself against the further extension of his rival's power. Had he attended to his own business in promoting the happiness and well-being of the people subjugated to his own rule, Nanking and the Kuomintang would never have ensnared him into their net or created the fiction that he was under their authority.

Even now, when the Despot of Manchuria has lost his job and with no prospect of reconquering his living, Nanking does not dare to reprimand, impeach or dismiss him, but meekly hands over the direction of its whole diplomatic and propaganda machinery to his nominees. The alliance between Nanking and Peking is the sole remaining link that justifies Nanking's assertion of authority and sovereignty over Manchuria. Destroy that link by eliminating Chang Hsueh-liang and Manchuria is as independent and safe from interference on the part of Nanking or Canton as is Central Africa or the Arctic regions. It is to preserve the myth of its authority and phantom sovereignty over Manchuria created by this already broken link, that Nanking so persistently supports a disgraced and defeated war-lord and permits its diplomacy and its representation on the League Council to be directed by his appointees.

* * *

By this time, the League Mission must realize that the problem it came to the Far East to solve has been so complicated by the march of events that it now faces a stone wall. It were much better had it never left Geneva, as its mere presence on the ground created hopes in the hearts of the Chinese that can never be realized except by war, and provided the opportunity for an intensification of the dispute by encouraging Nanking to stick to its policy of throwing all responsibility upon the League.

The position taken by Nanking in the Dairen Customs dispute constitutes all the proof necessary to convince the League that it was deceived and trifled with because of China's stubborn rejection of a recognized principle in international law; a principle that strikes at the very heart of the Covenant itself. It is useless at this late date to cry over spilt milk. The main facts of the dispute; the record of events and violation of treaties and agreements were known to every Foreign Office represented in the Council and Assembly of the League. The case was clear cut from the beginning. It is a reflection on the intelligence of the best minds in Europe and America to assume they were ignorant of the real issues involved, so we are forced to believe that in order to escape falling into the trap set by China, the League sought to delay its verdict as long as possible, in the hope that events would make for an amicable solution between the interested parties.

The League itself is fighting for its existence. China pushed it up against the firing wall and stood aside prepared to sacrifice the peace of Europe in order to gratify a thirty-five year old pent-up-anger-in-the-heart against Japan. The fight between China

and Japan was merely the screen concealing the preparations for a desperate assault upon the Versailles Treaty itself.

France alone seemed to sense what it was all about and marshalled her allies to defend their position. From the outset it was evident that France sympathized with Japan, not because of any direct interest in the future of Manchukuo or stake in the country, but because of the menace to her own security that loomed in the background. There is every reason to believe that this community of interests still exists and will make almost impossible any unanimous vote to penalize Japan for her resort to self-defense.

Many good friends of Japan who admit the justice and strength of her case, together with her fair-minded enemies, criticize the way she has handled the whole affair, deploring her lack of frankness in stating her objectives. It is contended even by the foremost champions of the League itself that had Japan duly presented her case at Geneva, it would have received friendly consideration and support. It is also argued that she should have placed her case before the other Signatories to the Nine Power Treaty in full and frank discussion, before resorting to force in defending herself.

It may be true that the letter of this treaty has been broken, but not the spirit. Technically wrong, Japan is morally justified. Great Britain and France called upon the other Signatories in 1927 to join in enforcing sanctions in the Yangtze Valley that would save their imperilled interests and avert the aftermath of treaty violations, boycotts and spread of communism. The United States declined to participate in any undertaking of this nature. Japan herself would take no action. Russia intervened in the affairs of China and carried on her war against the "capitalist and imperialist powers" behind the screen of the Nationalist movement, yet because one Signatory to the Nine Power Pact declined to sanction any interference from the outside, the Treaty could not be invoked. Furthermore, the other Signatory Powers have remained mute and acquiescent while Russia amputated Mongolia from the main body of China and incorporated the territory into its system of Soviet republics, thus bringing the menace of communism that much nearer to the sphere of Japan's vital interests and paving the way for further aggressions into regions where Japan's security became undermined.

All are Treaty Breakers

Not only was no protest raised against the rape of Mongolia, but the Signatories to the Nine Power Treaty (with the exception of the United States) in contravention of the terms of the treaty, entered into relations with a nation which had violated its principles.

It is unreasonable to entertain the belief that Japan would have received fair treatment in such a vital matter from a group of Powers more interested in curbing her expansion than in defending the principle of China's territorial and administrative integrity. Every move on the diplomatic chess board of the last two decades has tended to build a wall around Japan, compress her within the confines of her own restricted area and deliver her bound hand and foot to the certain come-back of Russia. Japan could hope for little sympathy from a group of Powers whose diplomacy was guided by such one-sided policies. In the last analysis, it was Japan's life that was at stake and she reacted to the danger the same as any other nation or individual would have done when there was no law or policeman to protect them.

In regard to the League, the case was different. Japan sat on the Council and gave this body her loyal and full-hearted support. Her case at the outset rested squarely upon the validity of the 1915 Treaty. By placing her grievances before the League, Japan would have committed the same tactical error that China was guilty of; forcing the League to accept jurisdiction in a dispute originating in a treaty extracted under duress. Had Japan planted this issue and created the precedent for a general assault on the Versailles Treaty, she would have received little sympathy or consideration from those very League champions who now roundly abuse her for doing otherwise. Japan, in this respect, played the game according to the rules, refraining from embarrassing her late Allies by precipitating an issue that would have undermined and destroyed the League, the balance of power in Europe and placed in jeopardy the peace of the world. Japan has made mistakes. She will continue to make them and muddle through the same as other nations have contrived to do when placed in similar embarrassing positions. In summing up, Japan cannot be charged with

deliberately sapping the foundations of the League by demanding its intervention in a dispute that would have terminated its usefulness.

We do not know what the League Mission now on the ground will recommend to the Council in its forthcoming report, but we sense its keen disappointment and chagrin over the fact that the situation outdistanced its labors. If there is a tendency on the part of the Mission to censure Japan for its failure to find a basis for negotiation, it will be only human and natural. If, however, it should be urged that the prestige and usefulness of the League has been in any way impaired by the creation of the new state of Manchukuo and its early recognition by Japan and the Covenant is invoked to penalize her, let it be remembered that had Japan taken the initiative in the dispute and forced the League into a

decision as to the validity of the basic treaty involved, by this time, those states suffering under the provisions of the Versailles Pact would be gleefully nailing down the lid on the League's coffin and Europe would once more be preparing for war.

Or, had the situation remained at a stand-still as it was when the League Mission was created and the latter was forced to seek a solution based on the legalities, the end would have been just the same. The Mission could not have balked the basic issue. The rapid and entirely unlooked for evolution of the situation into one which is outside the jurisdiction of the League, should be hailed by that body as saving its face and its usefulness for those larger and more important issues in Europe for which it was created and is specially designed and equipped to handle intelligently.

Chinese Soldiers

To the world at large and vastly more to China than to any other part of the world, the fight of the Nineteenth Route army at Shanghai early this year came as an extraordinary surprise. The resistance of this Chinese fighting force, now known throughout the whole world as the most famous of all China's armies, is destined to go down as one of the glamorous events in Chinese history and in the far-off ages of the future the deeds of Tsai Ting-kai and his men will form the common theme of dramatists yet unborn and will furnish subject matter that will pass into legend for the tellers of tales in the tea houses of another far-distant day. It is not too much to believe that this single brief engagement may completely alter the course of China's history as it has already changed the temper of its people.

All the reasons that brought the Nineteenth Route army to Shanghai in the closing days of 1931 perhaps have not yet been disclosed, but this force of twenty-odd thousand men was unusually well-armed and equipped and the evidence all points that they were keyed for a major enterprise. This was a Cantonese fighting force and superficially it is accepted that these soldiers were brought to Shanghai to guarantee the safety of those Cantonese leaders who with this armed protection behind them adventured into Nanking to talk about the reunion of Nanking and Canton in connection with Japanese invasion of Manchuria.

When the question of attending a conference at Nanking originally arose the Southern leaders had sharply in mind the unhappy experiences of the two Cantonese, Hu Han-min and Li Chi-san, who had awakened to find themselves prisoners after little disagreements with the Generalissimo, Chiang Kai-shek. So before the conference could be held at Nanking the government leaders there had to accede to requirements of the Cantonese who insisted upon safeguards and so the Nineteenth Route army thus came to Shanghai. The negotiations at Nanking failed utterly and the rift between Nanking and Canton was widened to the point of complete rupture when the Southern delegates departed from the Capitol on the Yangtze.

But this well-armed, well-equipped Nineteenth Route army still held the Shanghai-Nanking Railway, and holding the railway it held command of the Shanghai area, the source of the bulk of the Nanking Government's revenues. Loyal to the Cantonese leaders, it was obviously in opposition to the forces at Nanking and in Chekiang commanded by the Generalissimo, Chiang Kai-shek. And this opposition to Chiang Kai-shek was demonstrated most emphatically later after the clash with the Japanese began. Undoubtedly it was Chiang Kai-shek's realization that his source of revenues had been left in hostile Cantonese hands that prompted his order to the Nineteenth Route army to withdraw from Shanghai. The order was spurned and when Chiang Kai-shek then sent a considerable force to "pacify" the Nineteenth Route army after the clash with the Japanese had begun, that Nanking force found itself in a decidedly unhappy position. Under compulsion it adopted the only discreet course open and joined forces with the Nineteenth Route army. Later as the weeks of fighting with the Japanese dragged on and the fame of the Nineteenth army spread to the four corners of the world there was something of a general rush in all Chinese military quarters, a movement that even stirred to life that ancient side-stepper Feng Yu-hsiang, to get on the band wagon and to share in the glory.

Some Possibilities

It is a little interesting to speculate what might have happened if no Japanese attack ever had been made at Shanghai. If the Japanese had held off it is perfectly obvious that the Shanghai area would have remained under Cantonese domination bitterly opposed to Nanking and all its works, and in circumstances of this sort Nanking would to-day be in a position rather more difficult than that which now confronts it and assuredly Eugene Chen would not at present be far at sea bound for "somewhere in Europe."

That Nanking's control of Shanghai and of the revenues that it derives from this port were restored is directly due to the Japanese invasion which ultimately led to the withdrawal to Fukien of the Nineteenth Route army. This fighting with the Japanese assuredly saved Shanghai to Nanking and smashed Cantonese aspirations, for does anyone believe that the Cantonese leaders, after being rebuffed at Nanking and finding themselves holding military control of Shanghai, would ever voluntarily have loosened their grip on the port? Doesn't it seem logical that if the Japanese had held off, another first-class conflict between opposing Chinese forces would have been staged in Shanghai's backyard? Retreat by land was closed to the Nineteenth Route army, for in any direction they might have sought to move they would have been brought into conflict with Nanking's forces. Before the Japanese moved the Nineteenth Route army was virtually in alien territory and more or less, as they say, it was in a tough spot, for would Nanking have been willing to sit content with the main source of the Government's revenues in the hands of the Cantonese, holding that position with a force of only twenty thousand odd troops?

When the Cantonese settled down at Shanghai to await developments in the closing days of 1931 and the first weeks of January it was apparent to any resident of Shanghai that these soldiers were in a touchy temper. Weeks before serious trouble with the Japanese developed the soldiers of the Nineteenth Route army were digging trenches around Shanghai and were erecting barbed wire barricades. They were in a truculent mood toward all comers and this mood extended to foreigners as well, as was evidenced by a number of incidents that took place in Chinese territory near Shanghai in January.

Foreigner is Shot

It was at this time, a fortnight before the Japanese moved against Chapei, that Dr. A. Poges, Manager of the Shanghai branch of the American Express Company, was shot and killed, apparently without cause, on the road from Lunghwa one Sunday afternoon. Other foreigners who ventured over the roads outside of the Concession were molested and one incident that was fraught with tragic possibilities, but ended somewhat farcically perhaps may be retold.

Shanghai residents will remember the Sunday afternoon in January when a terrific explosion took place in the river above Shanghai. Sparks from a passing tug boat ignited and set off a whole lighter load of high explosive munitions that were being transported to Lunghwa headquarters. This happening was wholly fortuitous and involved no malevolent elements. Although it caused the deaths of a score of people on the river and shattered many panes of glass in the southern portion of Shanghai, the Shanghai broker and sportsman, Mr. Frank Vida is quite convinced that the blast saved his life and the life of a lad with him. Mr. Vida

and Mr. William Gande Jr. were on a road in Chinese territory not far from the river on their way to Shanghai when the sudden appearance of two Chinese soldiers with menacingly pointed rifles brought their motor-car to a sliding stop. In stopping his car Mr. Vida was forced to run by the two soldiers, both young boys, and he turned around to see both of them taking aim at himself and young Gande. The incoming air mail plane from Nanking was zooming in the sky overhead and it was at that precise instant that the blast in the river took place. The shattering shock of the explosion so startled and terrified the two soldiers that both dropped their rifles and fled through a field at the roadside. Mr. Vida threw in his gears and departed as swiftly.

These events at least give an indication of the state of mind of the soldiers of the Nineteenth Route army whose commanders certainly realized that while they held control of the immediate situation, they were in a position exceedingly hard to maintain and from which they could not hope to emerge without fighting of the most serious kind, and all this without taking into account the Japanese at all.

But in addition to this matter of the mental attitude of the men of the Nineteenth Route army and the peculiarities of the position they were in before the clash with the Japanese, other unusual factors were present that may explain why the Nineteenth Route army upset all calculations and put up the fight it did. The brutal truth is that in all the fighting of the past twenty years in China, fighting that has caused the deaths of many more than perished in the World War, the Chinese soldier has actually had no chance to show his quality. The instances in which he has had opportunity to prove himself, due to the monstrous venality of his leaders, have been rare, but they do exist.

Under the American, General Frederick Townsend Ward some seventy years ago in the Taiping rebellion, and under the British General, "Chinese" Gordon, who followed after Ward, the Chinese soldier revealed his real mettle. In all the warfare of the years since the founding of the Chinese Republic the deciding element that has been ever present, campaign after campaign, year in and year out has been—treachery. The coolie soldiers of the armies of the Chinese Republic in all of their conflicts have rarely or ever had any faintly glimmering idea of what they were fighting for. Opposed in battle to a foe, they went into action more than half convinced from the experience of other battles that before the fighting was done they would find themselves enlisted in the ranks of the enemy. That was what had always happened before.

A First-Class Fighting Man

It is due to these conditions that the words "soldier" and "bandit" have come to be synonymous in China and the fault does not lie with the soldier, for give this man a leader that he can trust implicitly, arm him adequately, feed him and pay his wages, give him a cause that he understands, and you have a first-class fighting man. If in addition to these things can be provided an audience to observe and applaud, your Chinese fighting man may attain heights that would be a challenge to all the records of martial history.

It was an approximation of all these particular conditions that was present last January when the Japanese forces went into action, and the Japanese did not take these things into account. They might have with safety discounted, as they did discount, the circumstance that they were outnumbered about ten to one by a foe holding a position of a kind said by military tacticians to be the most difficult successfully to attack, involving fighting through narrow streets and run-ways. They were misled probably by the record in Manchuria where a handful of troops in a surprise attack overwhelmed and captured a barracks housing a force of five thousand, and then later with a vastly inferior force numerically conquered and drove out the entire Manchurian army of two hundred thousand men.

On the record of what happened in Manchuria and in the light of the history of warfare in China through recent years they had no reason whatever to expect that this defending force of Chinese would fight. The world at large and the Chinese public itself did not anticipate that this Southern army would resist the disciplined modernity of the Japanese landing force. It was not until after the fighting had actually started that the general miscalculation became evident with the stunning realization that a completely novel situation with regard to the Chinese soldier had arisen. It is perhaps exceedingly fortunate for Shanghai that after the initial clash on the edge of Chapei the Nineteenth Route army remained

passive and content merely to hold their positions of defense. The Japanese went into action confidently that night with a force somewhat less than two thousand bluejackets unaccustomed to land warfare, many of them probably experiencing real fighting for the first time in their lives. Any semblance of a determined thrust back from the Chinese at this juncture could have had but one appalling result. The Japanese very swiftly realized their predicament and the plight of their nationals in Chapei and in the International Settlement as well, and this may account in a measure for the prompt appearance of Japanese bombing planes over the battle area. Why didn't the Chinese run after the first volley? What were the factors that produced this new situation?

Here Are The Reasons

It was disclosed very quickly that the men of the Nineteenth Route army completely trusted their young commander, General Tsai Ting-kai. They were well provided with arms and ammunition and their equipment, if not equal to that of the Japanese, was in first-class order. Upon their arrival in Shanghai they had been paid—it is said that each soldier received five dollars with the promise of more to come speedily—and food supplies were adequate. Plus these things these Chinese soldiers found themselves in conflict with a Japanese fighting force. Here was a cause that the imagination of the most benighted coolie could grasp and comprehend. They were fighting their traditional foe under circumstances that eliminated any remote possibility of treachery in any quarter. These were conditions that made for stern action, but there was present another element that possibly outweighed in importance all the other factors in the situation.

The Chinese of all walks of life instinctively are actors. The unfailing consciousness of the dramatic values in any and all situations is a racial trait that many observers from the Occident notice first in the Chinese and it is the commonest subject of comment of those who write about the Chinese. In the more favored circles of Chinese life the tendency is restrained, but even this restraint often gives emphasis to the trait. Among those of lesser degree the keen appreciation of the reactions of beholders in any given situation is plainly apparent. The lowliest coolie, aware that he is being observed, unconsciously takes the stage and plays his small part, often magnificently.

It is to be remembered that the tension between the Chinese and Japanese at Shanghai was at the breaking point for a full week or more before actual hostilities developed. Through this period when street outbreaks and group conflicts were growing increasingly frequent, and while broadsides of demands and protests were being exchanged between the leaders of both sides, leading at length to the final Japanese pronouncement and the proclamation from the authorities of the French and International Settlements of a State of Emergency—through this whole period the soldiers of the Nineteenth Route Army feverishly were preparing for eventualities. Weird tales were being told at that time in the tea shops of Foochow Road of ceremonials at which units of the Chinese forces gave mutual pledges of loyalty to the death in resisting the invader.

All the least details of the happenings of that grim week of suspense were described in the headlines and columns of newspapers throughout the world, and a veritable avalanche of publications of every sort filled the streets of the cities in China. Noted publicists and newspaper correspondents from all corners of the globe descended in a swarm on Shanghai and the whole world suddenly focussed its attention on this port. Probably no event in recent history anywhere in the world ever was given publicity on such a colossal scale as were the preliminaries and events of the Shanghai conflict. Karl H. von Wiegand, veteran top man of the Hearst organization's foreign staff, said that the papers in America were spending more on the Shanghai outbreak than they had spent through any like period of the world war.

The stage was set and ready and when in the late hours of that January night the Japanese bluejackets started marching, their conspicuous white leggings moving in measured cadence through the murk of the streets of the Hongkew section as the Chinese forces settled in grim watchfulness in their positions in Chapei, it marked the opening scene of an international spectacle. When the soldiers of the Nineteenth Route army unlimbered their guns for action they did so after days of the keenest anticipation of the event about to unfold and they realized fully that they were staging their show, not only before the eyes of all of their countrymen, but also under the rapt gaze of the whole world. It is to be wondered at that they are not still in their trenches. Many of them are.

A Straw in the Wind

George Bronson Rea Becomes an Advisor of Government



R. GEORGE BRONSON REA, Owner and Publisher of *The Far Eastern Review*, who has long been known internationally as an outstanding authority on Far Eastern affairs, has been appointed Advisor to the new Government of Manchukuo, the first foreigner to be recruited in this capacity into the service of the régime that has succeeded the Chang monocracy in that troubled area of Asia called the Three Eastern Provinces—Manchuria.

Mr. George Bronson Rea in point of work done, year in and year out, is undoubtedly the oldest American newspaperman in the Far East with a record that goes back to his days as a war correspondent in Cuba and in the Philippines at the time of the Spanish-American war. He has lived in the Far East in the most intimate touch with the changing events of his times for a period of thirty years and in the 28-year period that he has owned and directed the *Far Eastern Review* he has won a singular eminence as a writer and as an authority on conditions in the Orient. It is paradoxical, in fact, that the publisher of a magazine primarily devoted to engineering, and it should be stated that in the flush of his early manhood Bronson Rea set out in life as an engineer, should have the most strident voice editorially in this part of the world, a voice that is heard and quoted in all parts of the civilized world.

The newspaper reports of Mr. Rea's appointment do not say that he has accepted the position. Mr. Rea has been absent from his office in Shanghai almost continuously through the past eight months. He has not seen fit to communicate with his office regarding the appointment or, in fact, on any other subject, and, therefore, what is written here is set forth quite without his knowledge or consent. But it is assumed, wholly on the newspaper reports, that he has become the first foreign advisor to the Manchukuo Government, and upon this assumption it is to be pointed out that this particular event may be regarded as exceedingly significant. This development, involving but a single individual, may be the "straw in the wind" that points the way that things are going to go in Asia. In terse phrasing a friend of Mr. Rea's put it bluntly on reading the news report of the appointment. "If Bronson Rea has taken on that job," he exclaimed, "then Manchukuo—recognized or not recognized, and whatever the League or other interest does or does not do—is going to be a government."

Certainly, now, this is not to be taken to mean that George Bronson Rea himself is going to be able to order the course of international events, but assuredly it does mean that out of his many years of study and observation of events in China, Bronson Rea is much better equipped to guess just what is going to happen than the man on the street, or the man across the Pacific—even at Washington.

This is not the first time that a distinction of this character has come to George Bronson Rea. He was the intimate and, more than any other, was the trusted foreign counsellor of the late Dr. Sun Yat-sen. At one time he held an unrestricted Power of Attorney that was placed in his hands by the great departed Chinese leader, and the fact that until the day of his death Sun Yat-sen called Bronson Rea friend, is evidence that the trust that was given was faithfully fulfilled.

George Bronson Rea has always had a clear-eyed vision of the complexities of life in China. It is true that many times his editorial

writings have stirred resentment and antagonism. His opposition to the succeeding military oligarchies that have ruined the country and his championship of the down-trodden, despoiled people have been consistent and unwavering. His has been a lone voice in the wilderness crying for justice for a great people enslaved by the cruelties and rapacity of heartless military overlords. Through the years while chancelleries abroad and diplomats at Geneva debated about China—occasionally—balancing, for considerations, the power of one military leader in one section against the prestige of another in some other place while hapless millions starved for the lack of the seed grain that had been stolen from them by the soldiers, and other millions were put to the sword ruthlessly by unrestrained bandit armies, while all the niceties and polite interchanges of diplomacy have been in process of being ironed out to the satisfaction of this or that Chinese militarist, it has been George Bronson Rea in his editorial columns who has told of the woes of the people of China and has cried out for justice and for their forgotten rights to exist. He has been a realist who has looked at things as they are and has refused to accept them as being what venal leaders pretend

them to be. He goes well-equipped with knowledge and experience to the big new task that he is assuming. With regard to Manchuria George Bronson Rea is one of those who from the first has accepted at face value the often reiterated declaration of the Japanese that they held no territorial aspirations in China.

Along lines of reasoning that Bronson Rea has laid down in the past, open-minded observers may discern a possibility that as an ultimate outcome of the Japanese action in Manchuria the seemingly impossible may be realized, and an actual unification of China may be achieved. Under an ordered government which safeguards the welfare of the people of Manchukuo an era of progress and prosperity may with reasonable certainty be expected in coming years. An achievement of this kind in this part of China might be expected to serve as an example for other parts of the country. In time this happy state of good government should spread. One section after another might conceivably come under the spell of the new order, each in turn rearranging its affairs until, as a logical development, either a confederation of states under a single régime might be effected or, what is less likely, advances all over China

might be made to such a degree that a complete reunification including Manchukuo, with China on the basis of a first-class Power, could be brought about.

The disorder and chaos of recent years in China proper will not be permitted to continue unless the whole country becomes engulfed in communism, which would mean the final extinction of China as a nation. In the face of the imminence of such a contingency the Government of Manchukuo might be called to play a major rôle. For its own survival this new government of to-day might have to act, and in imposing its will over China proper it would have to impose its own rule over the country at the same time. And that would be another form of the long-awaited unification of the country.

It is into this troubled future fraught with perplexing uncertainties and with an ever-present menace from the west to guard against that the new Government of Manchukuo to-day is facing events to come, and at such a time it is fortunate indeed to have a counsellor of the calibre of George Bronson Rea.—val.



MR. GEORGE BRONSON REA
of the FAR EASTERN REVIEW

From the North-China Daily News, June 2, 1932

St. John 4: 44

IN the April number of *The Far Eastern Review*, the Publisher, Mr. George Bronson Rea, presented a long article on the subject of the American "Open Door" doctrine in the Far East, and after this had been republished in pamphlet form by a Japanese organization in Shanghai, certain reactions that were disapproving developed locally and found expression in the columns of the Shanghai American newspaper, *The Evening Post and Mercury*. These took the form of a letter that appeared over the signature of the Rev. Charles L. Boynton, Statistical Secretary of the National Christian Council, and former Editor of the *Directory of Protestant Missions in China*, and preceding this letter, was a dissertation in the editorial columns of the paper.

In Mr. Boynton's published letter details of Mr. Rea's contentions were attacked and questioned. Mr. Boynton asserted that Mr. Rea had erred in statements regarding the sum of money expended annually for missionary work in China and regarding the number of American missionaries active in the China field.

Mr. Rea is not in Shanghai and it is not possible, therefore, to ascertain all the sources he employed in the preparation of his article. From the article itself, however, it should be apparent that the writer had not the remotest intention to go into questions pertaining to missionaries and mission work in China. In this field, let it be conceded, Mr. Boynton should be 100 per cent right all the time.

What Mr. Rea undertook to prove, briefly, was that the "open door" doctrine is an utterly fallacious belief and that instead of being a boon to American interests it has proved to be an increasingly costly conception which was brought into operation thirty-three years ago by the American State Department in ignorance of essential facts that then existed which did not come to light until more than two decades later. In a thesis of this scope only approximations can be given to verify general conclusions and in striking a balance between the sums total that yearly flow from American sources into China and from Chinese sources into the United States, so far as they properly can be related to the "open door" doctrine, Mr. Rea listed, among other things, the outlay of "upwards of \$15,000,000 a year contributed by the American people for carrying on missionary, educational and general uplift work in China."

In his letter Mr. Boynton insists that no such sum is expended by Americans for missionary work in China, and undoubtedly he must be right, but it does not necessarily follow that Mr. Rea is wrong. Certainly a very considerable proportion of the \$15,000,000 does go for missionary work and if to this proportion is added the extensive outlay for educational work, for famine and flood relief, for governmental assistance in one form and another and for all that diverse list of items that would come under the heading of *general uplift work*, then it seems fair to assume that some approximation of Mr. Rea's sum of "upwards of \$15,000,000" would be reached. In his letter Mr. Boynton sets forth some figures on missionary expenditure, and the correctness of these is not to be challenged, but they can only be regarded as a portion of the total that Mr. Rea mentions. Mr. Boynton's figures, of course do not take into account at all the considerable expenditure in China from American sources for Roman Catholic missionary activities.

Of less importance anent the validity of Mr. Rea's assertions regarding the "open door" doctrine is the question of the precise number of American missionaries whose activities are devoted to China. In his letter Mr. Boynton says, "because Mr. Rea has heard somewhere that there were at one time 8,000 missionaries to China, he assumes that they were in China and that they were Americans." Again correct. Probably Mr. Rea did hear somewhere that there were at one time 8,000 missionaries to China. Possibly he read it in the *China Christian Year Book*, 1928, Chapter XV, which was written and contributed to this work by Mr. Boynton himself. On page 156 of this work one reads.

"On January 1, 1927, there were somewhat over 8,000 names of missionaries including wives to be found on the active lists of Protestant missionary organizations in China."

Certainly all of these may properly be designated as missionaries to China, whether all of them were in China at one time or not.

All of this surely hasn't anything to do with argument about the American "open door" doctrine, but perhaps a glance at other of Mr. Boynton's figures in his letter is permissible. He goes back ten years saying, "In 1922 complete statistics showed 7,665 missionaries to China of whom 4,154 were from the United States. "Of these 1,488 were men, 1,294 were wives of missionaries, and 2,466 were single women." 'Tis a bit baffling, but figure it out yourself. He says "4,154 were from the United States" and then lists 1,488 men, 1,294 wives and 2,466 single women making a total of 5,248. Perhaps Mr. Rea was misled.

The editorial which *The Evening Post and Mercury* publishes which so sharply chastises Mr. Rea appears under the title, "The Open Question." It is, indeed, an open question to determine what to say about this. Here are fifteen or sixteen hundred words strung together that sound like a Klaxon horn with the asthma. A perusal of them has the effect of inducing a gentle fatigue. Major portions of this intellectual effort consist merely of textual repetitions of paragraphs from Mr. Rea's article, arranged hit or miss fashion without regard for continuity or relationship. What's the answer when a disputant simply repeats one's own words and then says, "O, tosh!"

The whole editorial seems to have been set down in something of a spirit of juvenile churlishness with the attempt to make a sneer serve as an argument and thus prove that Mr. Rea's preaching on the "open door" doctrine, somehow or other, is all askew. "Haw, Haw! It ain't so," seems to be about all it says, which doesn't leave much scope for rebuttal. There are many variations of this provincial style of expressing disagreement. These range from the simple lady-like, "It isn't so just because it isn't so," on through a great variety of familiar expressions, including the use of the "short and ugly word" and down to that trenchant American phrase that should only be used with a smile.

Now, to the heavy mass intellect that grades to a "run of the mill" standard or just below, snappy answers in these categories rate as red hot, but, of course, they haven't anything to do with the facts of any case. But lord, what's the use? Whatever may have been the implications in the vexed brain of the editorial writer, let us conclude, since the weather is hot, that he did say it with a smile, and let it go at that.—val.

Brigandage in Manchuria

Keeping the Record Straight

DR. DUGALD CHRISTIE, C.M.G., the author of "Thirty Years in Mukden, 1883-1913," is one of the best known and beloved missionary figures that have come to China, respected and honored by foreigners and Chinese alike. Dr. Christie came out to China in 1882 and settled down in Mukden to devote a lifetime of self-sacrifice in doing good to the Chinese people. He is now at home in Scotland and in a recent speech on conditions in Manchuria delivered before the Glasgow Auxiliary of the Mukden Medical College, which he founded, said:

"Japan also said that her people were not safe because of brigandage. He had no hesitation in saying that it was since Manchuria came into touch with outside nations that brigandage had become really dangerous. As for Japan's complaint that her nationals were not safe, he had to say that if that was so, it was their own fault. A great deal of the propaganda in Manchuria was engineered and supported by the Japanese themselves. There was a great deal made of this propaganda simply in order to further the interests of Japan."

When men of such high standing integrity and long experience in Manchuria, like Dr. Christie, make such direct statements, the public accepts them as authoritative. Perhaps the good doctor was so engrossed with his humanitarian work that he had no time to travel around Manchuria or listen to the tales of those who did.

The real story of brigandage in Manchuria is revealed in a book entitled "The Long White Mountain, or a Journey in Manchuria" written by H. E. M. James of Her Majesty's Bombay Civil (Continued on page 311)

Towards the Establishment of a Factory Inspectorate in China*

By C. PONE, Chief of Section, International Labor Office

AMONG the various questions relating to labor in China which have from time to time been discussed there were two important occurrences, both dating some years back. The first of these was the promulgation of Provisional Factory Regulations by the Peking Government on March 29, 1923; the second consisted of the efforts made by the authorities of the Shanghai International Settlement to regulate the working conditions of women and children. Neither of these reached any positive result and until quite recently there was no effective regulation of labor conditions in any part of China. The establishment of such a system seems to have held a foremost place in the plans of the Chinese National Government since its installation in Nanking. The outcome of its efforts was the promulgation on December 30, 1929, of a Factory Act, whose principal provisions may be briefly summarized as follows.

The Act applies to all factories, which are defined as industrial undertakings usually employing thirty or more workers and using motive power (steam, gas, electricity, or water). Children under fourteen years of age may not be employed in factories, young persons under sixteen years of age may not be employed at night between 7 p.m. and 6 a.m., or by day for more than eight hours, and they may not be employed on dangerous or unhealthy work. Women may not be employed at night between 10 p.m. and 6 a.m. and they, too, may not be employed on dangerous or unhealthy work. The normal working day is eight hours, but it may be extended to ten hours if this is rendered necessary by local conditions and the nature of the work. In case of force majeure the hours of work may be extended, but they may not exceed twelve per day. The total amount of overtime may not exceed thirty-six hours a month; it must be paid for at one and one-third times the ordinary rate. Every worker must have a break of half an hour after working continuously for five hours. Every worker must have one day of rest in each period of seven days. All factories must cease work on the holidays specified by law and by order of the National Government. Every worker employed uninterruptedly in a factory is entitled to annual leave with pay, the length varying from seven to thirty days according to his period of service in the factory. Minimum wage rates are to be fixed on the basis of conditions in the different localities. Wages must be paid regularly at least twice a month and in the local legal tender. Female workers must be paid at the same rate of wages as male workers where they perform the same kind of work with equal efficiency. An employer may not deduct in advance a part of the wages of a worker as a deposit for payment of damages or security for fines. Employers must provide for the safety and health of their workers and give them proper training in accident prevention. Where the provision for safety and hygiene is inadequate the competent authority may require improvements to be made within a definite time limit; if necessary it may suspend the operation of the whole or part of the factory. The employer has to bear the expenses of medical treatment for workers who fall sick or are injured or lose their lives in the performance of their duty, and must pay allowances or compensation on a scale fixed by the Act. The Act also contains provisions on the termination of contracts, arrangements for workers' welfare, supplementary education, leave with pay before and after childbirth for eight weeks, the promotion of thrift and co-operation, the organization of amusements for the workers, and profit sharing for the workers. It provides for the institution of factory councils composed of equal numbers of representatives of the employers and the workers, the latter to be elected by their fellow-workers. There are also various provisions relating to apprenticeship. The Act concludes by setting out the penalties for contravention of its various provisions.

This Act, which was promulgated on December 30, 1929, was to come into operation on a date to be fixed by decision of the National Government. This date was originally fixed by the

Government at February 1, 1931. Subsequently, at the request of the employers, it was postponed to August 1, 1931, and a Ministerial Order of August 7, 1931, declared that the clause prohibiting the employment of women at night should not come into operation until after the lapse of a preparatory period of two years.

Administrative Regulations of December 16, 1930, supplemented and explained the provisions of the Act on various points.

Lastly, the Factory Inspection Act of January 31, 1931, whose date of coming into operation was fixed by Order at October 1, 1931, deals with the organization and working of the factory inspectorate, which has to enforce the Factory Act. This Act provides that the inspection of factories shall be carried out by factory inspectors appointed by the central administrative authority for labor, which shall make arrangements for the training of future inspectors and determine the points to which their inspection shall relate. These are defined as follows: age of admission of children, nature of their work and of the work done by women, leave before and after childbirth, hours of work, rest periods and annual leave, hygiene and safety, industrial accidents, working conditions and treatment of apprentices, the keeping of the registers and records required by the Factory Act.

For the organization of the factory inspectorate contemplated by this Act of January 31, 1931, the National Government of the Chinese Republic requested the assistance of the International Labor Office. The Governing Body of the Office accepted this invitation and the Director of the International Labor Office entrusted the proposed mission to an official of the Office, Mr. Pône, Chief of Section in the Diplomatic Division, and Dame Adelaide Anderson, former Principal Lady Inspector of Factories in Great Britain, who went to China during the autumn of 1931.

Extracts from the report on the mission submitted to the Director by Mr. Pône are given below. It should be added that this report was written early in January, and therefore before the events that have taken place in the Shanghai district since the end of that month, a result of which will be to delay for some little time the materialization of the plans for the organization of factory inspection in that district.

* * * *

In his letter of February 26, 1931, in which he requested that the Office should send a mission to China, Dr. Kung explained its object in the following terms:

You have undoubtedly received the report that our Factory Law and Law of Factory Inspection have been promulgated. But as the question of extraterritoriality is not settled, immediate uniform enforcement of the Laws throughout the land would have been faced with difficulties. So the Government has postponed the enforcement date of these Laws until August 1, of this year. Meantime, we are making all the necessary preparations, including the establishment of an inspectorate, which, of course, will not be on a big scale in the beginning. In the course of creating the inspectorate we have been already confronted with problems, the solutions of which require expert opinion and assistance. . . . I wonder if a similar expert commission on factory inspection can be sent from your Office to China to assist us in clearing the obstacles and thus facilitate the works of our factory inspection.

The purpose of our mission, as defined in this letter, was thus limited to assisting the Chinese Government in the organization of a factory inspectorate.

The Factory Act had officially come into force on August 1, 1931, and steps had already been taken to set up a factory inspectorate. An Act of January 31, 1931, which was to come into force on October 1, 1931, laid down the general principles for the

organization and working of the factory inspectorate. It prescribed in particular the qualifications and aptitudes which the future inspectors must have, and laid down that the appointment of those officials and their training would be undertaken by the "Central Administrative Authority for Labor," namely, the Labor Department of the Ministry of Industries. The Government had come to the conclusion that, in the circumstances, there could be no question of setting up immediately a complete inspectorate for the whole country, and had considered it preferable to request the authorities of the provinces and independent municipalities themselves to constitute local inspectorates with their own resources. In accordance with the Factory Inspection Act, however, inspectors would be appointed by the Ministry of Industries and would be required, before their appointment, to follow courses of training organized by the Ministry. Two courses of three months each were to be held before the end of 1931, and the various provincial and municipal authorities had been requested to suggest names of persons fulfilling the conditions laid down by the Act to follow these courses. The courses were organized at Shanghai under the direction of Dr. K. Fou, an official of the Ministry of Industries.

On our arrival in China the first of these courses, which had begun in June, had just come to an end. It had been attended by about thirty candidates from various parts of China, and the instruction, which was given by persons who had all completed their studies in foreign countries, included the following subjects: general labor questions, Chinese labor legislation, comparative studies of the organization of factory inspection, industrial hygiene, prevention of industrial accidents, scientific management, industrial statistics, study of Chinese industries, industrial accountancy, industrial ethics, the drafting of Chinese administrative documents, and the principles of Dr. Sun Yat-sen.

After the first course 24 candidates were examined and declared capable of assuming the functions of factory inspectors. Of these 24 candidates 16 had been nominated by municipalities (Shanghai, 10; Peiping (Peking), 2; Tientsin, 1; Weihaiwei, 1; Tsingtao, 2) and eight by provinces (Kiangsu, 2; Chekiang, 2; Hopei, 4).

A second course, organized under the same conditions and under the same direction, was to begin on September 15, and was to be attended by about the same number of candidates.

Thus at the time of our arrival preparations had already been made for organizing local factory inspectorates in different parts of China. In these conditions the Ministry of Industries felt that the assistance of the mission from the International Labor Office could be especially useful in organizing one of the local inspectorates contemplated, and in particular the most important of them, namely, that of Shanghai, which was to be set up as from September 1. The provisional statistics prepared by the Ministry of Industries showed in fact that the working population of the undertakings subject to the new Factory Act throughout the whole of China amounted approximately to 400,000 workers, whereas the district of Shanghai alone included 160,000.

It was obvious that we could not form any considered opinion or offer suggestions of any practical value until we had made a preliminary study, however brief, on the spot of the conditions of labor in the principal industries of the Shanghai district, in relation to the organization and working of the factory inspectorate. We therefore devoted the first weeks of our stay in Shanghai to that task, in the course of which we visited as large a number of factories as possible, chosen over a very wide range as regards both the nature of the industry and their size and the modernness of their equipment, and situated partly on Chinese territory, partly on the territory of the Settlement and of the French Concession.

We thus visited a considerable number of factories, some fifty or so, at Shanghai, paying particular attention to the industries in which large numbers of women or children were employed, and especially to cotton spinning and weaving mills, silk spinning mills, cigarette and match factories, indiarubber shoe factories, knitting factories, textile dyeing and printing works, etc. A large number of these factories were visited in company with one or two of the factory inspectors appointed by the Chinese Municipality of Shanghai as from September 1, 1931. In certain factories situated on the territory of the Settlement we were accompanied by officials of the Settlement Fire Brigade. In other cases we visited the factories unaccompanied, with the approval or on the invitation of their owners or managers.

It is obvious that these visits, many of which had to be made very rapidly, could not be considered as constituting a real enquiry

into conditions of labor in the Shanghai district. They could only be, and in fact were, merely a series of trial soundings undertaken in order to see for ourselves the conditions in which a factory inspectorate would have to operate and the possibilities open to it. During these visits we were concerned less with collecting complete and detailed information on the conditions of labor (details which could only be obtained by a minute and thorough enquiry which it would be very desirable to carry out) than with forming rapidly certain impressions of the conditions in which the factory inspectorate could in practice carry on its operations.

The general impression which we quickly reached was that the conditions of labor in the factories we visited were generally* far from satisfying the rules laid down in the new Factory Act, and that the observance of those rules, however desirable and even urgent it might be, would require very considerable modifications in the organization and methods of working of a large number of factories.

In all industrial countries, even in those where development has been most rapid, the regulations on labor conditions have come into existence step by step and little by little and the process has often occupied several decades. It has thus been possible to bring them into operation without requiring over-general or over-sudden modifications in the organization of industrial undertakings. At the same time, this has enabled the factory inspectorate to be progressively developed. The new Chinese Factory Act, on the contrary, deals with the most varied questions all at the same time, and right at the outset adopts the most modern solutions which have only been reached in other parts of the world by a more or less slow and gradual process of development.

Moreover, it had to be remembered that a factory inspectorate recently set up and composed entirely of new and therefore inexperienced officials could not all at once see that all the provisions of the Factory Act were applied. If it had been instructed to do so, it would in all probability have failed, so greatly retarding instead of expediting the enforcement of the Act.

It was for this essentially practical reason that we suggested that during the early period the activities of the factory inspectors should be limited to a few essential points which had the double character of presenting special urgency and of not having given rise to any objections among organizations of employers or of workers. During that period the other provisions of the Act should not however remain a dead letter: the inspectors should, in the course of their visits, collect the data concerning their subsequent enforcement; they should also prepare the employers for that enforcement by calling their attention to the provisions in question, and giving them advice and suggestions of a helpful kind.

The first stages of the inspectors' work should, we thought, be as follows:

First stage. During the earlier months, say until the end of 1931, they should visit all the factories in their districts, get into touch with the managers of the factories, collect data on the number of workers employed, and supply the managers with registers in which to enter the particulars required by the law.

Second stage. The inspectors should then devote the major part of their efforts to the conditions of health and safety in the factories. They should request the heads or managers of factories to amend immediately the most outstanding dangers and omissions discovered. At this stage they should investigate every case of an industrial accident which comes to their knowledge, even if no notice has been sent them by the head of the factory.

They should also see that the reports of these accidents are furnished promptly in the cases mentioned in section 48 of the Act.

They should also keep in mind the effective enforcement of sections six and seven of the Act prohibiting the employment of children on difficult or dangerous work.

Third stage. Next, they should see that the provisions concerning weekly rest, breaks, holidays, etc., are properly applied. At the same time they should prepare the way for the enforcement of the other requirements of the Act, as indicated above; that is to say, they should collect the necessary data (ages of children employed, hours of work of women and children, organization of shifts, hours of work of adult men, etc.) and instruct the heads of factories as to their future duties under the Act.

*We say "generally," for we encountered very interesting exceptions, among Chinese as well as among foreign factories. In particular, certain Chinese factories which we visited are equipped and organized in an entirely modern manner.

It was only after considerable hesitation that we did not suggest to the Minister of Industries that the provision concerning the age of admission of children to industrial employment should be included among the provisions of the Act which were to be immediately enforced by the inspectors. The abuses we noted in this connection are without doubt the most deplorable, and it is an urgent matter to abolish them. We became convinced, however, that it would under present conditions be very difficult for the inspectors to ensure the immediate application of the provisions relating to the age of admission to employment, and that if they were instructed to do so all their energies would be absorbed, without great benefit either to general progress as regards conditions of labor or to the improvement of the situation of the children themselves. In order to be in a position to exercise an effective control in this matter the inspectors should first, in our opinion, collect as accurate data as possible on the number and age of the children employed in the factories of their district. We suggested that they should give special attention to this point, even in the early stages of the activities of the factory inspectorate.

We also pointed out to the Minister of Industries how important it was, in our view, to develop popular elementary schools in industrial centers as a means towards carrying out this reform. We also brought this question specially to the notice of the League of Nations Mission which was visiting China at the same time as ourselves, and whose duty it was to advise the Government regarding the organization of public education. In that direction the Chinese authorities have a most urgent task to perform, and one which is the very basis of all effective social action for the suppression of the employment of young children.

Such were the conclusions and general observations at which we arrived after a careful and objective study of the conditions in Shanghai. It was for the Government to decide what effect should be given to our suggestions. We did not, however, consider our task as ending there, and we felt that it was our duty to give our personal assistance to any action which the Government might see fit to take. We lost no opportunity, either during our visits to factories or when meeting employers' organizations or individual employers, or in our conversations with the leaders of the workers' organizations, of referring both to the urgent necessity of instituting a factory inspectorate at Shanghai, and also to the immediate tasks which we considered should be entrusted to it. As a general rule we found that those to whom we spoke were most favorably disposed, and we were happy to note that attitude, which appeared to us an essential condition for the successful working of a factory inspectorate.

It was also a favorable element towards the solution of the difficult problem of the working of the factory inspectorate on the territories of the International Settlement and of the French Concession.

From the provisional statistics drawn up by the Bureau of Social Affairs of the Chinese Municipality of Greater Shanghai, it appears that in the whole district of Shanghai there are 673 industrial undertakings considered as "factories" for the purposes of the Act of December 30, 1929. Of these 673 undertakings, 372 are on Chinese territory, 249 in the International Settlement, and 52 in the French Concession.

It will be seen from these figures that industrial activity is distributed over the whole of the Shanghai district. Although the different parts of the district are in very different legal situations, the working population is everywhere the same and social conditions are everywhere identical. Thus it would at first sight seem clear that it would be impossible to establish a system of labor regulations for one section only of the district. We were ourselves soon convinced that this view was justified. It is after all nothing but a practical illustration of the fundamental conception which underlies the constitution of the International Labor Organization.

The problem of the regulation of labor in the Shanghai district is not a new one for the International Labor Organization, and has already repeatedly been before it. The Conference considered it at its First Session in Washington, for the Committee on Special Countries was evidently thinking principally of Shanghai when it referred to the special difficulties which the Chinese Government might experience in framing and administering labor legislation, owing to the existence of foreign settlements and leased territories within its area. The problem of Shanghai has frequently been mentioned at the Conference since that time. It must, however,

be admitted that the problem is not an easy one to solve, as is shown by the failure of the very serious effort made in 1924 by the Municipal Council of the Shanghai International Settlement.

It is difficult without having been on the spot to realize the extraordinary situation of this great district, which now has some three million inhabitants. Its situation is so complex in all respects that two years ago the Municipality of the International Settlement asked a South African legal expert, Judge Feetham, to spend a year in making a first-hand study of the question. It is sufficient to read the long report summarizing the conclusions reached in that enquiry in order to form an idea of the innumerable practical problems raised by the co-existence in the Shanghai district of the three absolutely separate and distinct systems of administration which have been mentioned above: the Chinese Municipality, the International Settlement, and the French Concession. It may be mentioned, in order to give some idea of the resulting complications, that Chinese-owned factories are to be found not only on Chinese territory, but also on that of the International Settlement and the French Concession, while, on the other hand, there are foreign undertakings on Chinese territory. Thus, even if only two classes of factories, Chinese and foreign, are taken into account, no less than six different situations may be distinguished: (1) Chinese factories on Chinese territory; (2) foreign factories on Chinese territory; (3) Chinese factories on the territory of the Settlement; (4) foreign factories on the territory of the Settlement; (5) Chinese factories on the territory of the French Concession; (6) foreign factories on the territory of the French Concession. A further distinction should be made according to the nationality of the foreign factories. But even without that matters are sufficiently complicated. If it is further remembered that the various legal situations are ruled by Acts and Regulations which have been in existence for some time and are not always very clear, that different and sometimes contradictory administrative traditions and customs have been established and become consolidated, and that political considerations are not absent, it will be realized that it is no easy matter to put into practice a uniform system of labor legislation amid such involved intricacies.

We nevertheless formed the impression, after our first contacts with the authorities of the Chinese Municipality, the International Settlement, and the French Concession, that there was a real determination to settle the problem. We found in the first place that in the Settlement and the French Concession there was no intention of ignoring the new Chinese factory legislation. In August, 1931, the Municipal Council of the International Settlement had published a declaration expressing its adherence to the principles of the Factory Act. As regards the French Concession, we had been informed of the results of an enquiry carried out by the Committee on Specially Unhealthy Undertakings in the Municipality in order to determine what undertakings would come under the Chinese Act. In the case of the Chinese Municipality there appeared to be a readiness to accept any arrangement that would result in putting all the factories of the district on the same footing. But while there was a general desire for the practical application of the new Chinese legislation, we also found that there were serious differences of view as to the means of attaining that object. The authorities of the Settlement and the French Concession made reservations as regards the practical possibility of applying certain provisions of the new Act; they at the same time insisted on the continued observance of the Administrative Rules of the Settlement and the Concession.

On the first point, the conclusions we reached in our brief enquiry into the existing conditions of labor in factories seemed likely to give the authorities of the Settlement and the Concession all the reassurance they could require.

As regards the second point, the situation created by the Factory Act was not altogether a new one. It was not the first time that the question of applying a Chinese Act on the territory of the Settlement and the French Concession had arisen. An interesting precedent had been brought to our notice, namely, the application of the new Chinese Act on the standardization of weights and measures. The solution that had been devised in that case had not yet been definitely adopted, but was more or less accepted in principle by the Chinese Government and the authorities of the International Settlement. It consisted in authorizing the Chinese inspectors to inspect commercial undertakings in the Settlement which came under the Act, provided they were accompanied by a police officer of the Settlement. We thought

that a similar method could be contemplated in the case of factory inspection. With the authorization of the Chinese Government we therefore approached the authorities of the Settlement and the French Concession and suggested that they should agree to a method of this kind. After preliminary negotiations with those authorities we asked the Ministry of Industries to call an unofficial meeting of these various authorities to try to reach an agreement.

Two meetings were accordingly held at Shanghai on November three and six, the chair being taken by Dr. Zau, Vice-Minister of Industries. The meetings were attended by General Macnaghten, Chairman of the Municipal Council of the International Settlement of Shanghai, assisted by Mr. Fessenden, General Secretary of the Council, Mr. Koechlin, Consul-General of France, assisted by Mr. Verdier, Director of Municipal Services in the French Concession, Mr. Yen, Mr. Kuo, and Mr. Fou, of the Ministry of Industries, Mr. Tehou, a former official of the Ministry of Industries and delegate to the International Labor Conference, and Mr. Pan, Director of the Bureau of Social Affairs of the Chinese Municipality.

At the first of these two meetings the following two principles were unanimously recognized:

(1) that there should be only one system of labor regulations for all parts of the industrial district of Shanghai;

(2) that the regulations should be applied by an inspectorate acting in a uniform way.

With regard to the latter point, it was not possible at the first meeting to reach agreement as to the means of putting the principle into practice. A number of different methods were proposed. It does not appear necessary to describe in detail the various methods suggested. It will be sufficient to say that at the second meeting held on November 6, 1931, the day before we left Shanghai, agreement was reached on the three following additional points:

(1) the authorities of the International Settlement and the French Concession agree to engage as factory inspectors persons who have attended the preparatory courses organized by the Chinese Government and have been nominated by that Government; they also agree that these inspectors shall be under the supervision of officials of the Central Factory Inspection Department of the Chinese Government;

(2) the inspectors will report regularly to the Chinese Government at the same time as to the authorities of the International Settlement or the French Concession;

(3) conferences will be held regularly once a month between the inspectors of the Municipality of Shanghai, the International Settlement, and the French Concession to exchange views and co-operate with one another in order to settle any difficulties that may arise.

The above principles were accepted in our presence by the three parties concerned at the meeting of November 6, 1931. It was, however, necessary to embody them in diplomatic agreements concluded separately between the Chinese Government and the authorities of the International Settlement and the French Concession. We were given an assurance that the official agreements would be signed very shortly.

If the agreement of principle which was obtained during our stay in Shanghai is applied practically, it may be hoped that the necessary conditions will be realized for the regular working of a factory inspectorate throughout the industrial district of Shanghai. This will be one step forward towards the improvement of labor conditions in China. Important as such progress will be, it will however be insufficient so long as it is limited to the Shanghai district only and not accompanied by measures applying to other parts of China. Shanghai is not the only industrial center of the country. Quite close to Shanghai, for example, there is a very large industrial town, Wusih, in which regulation of conditions of labor is equally urgent, as we saw in the course of a short visit which we made during our stay at Shanghai. Tientsin, Peiping, Hankow, Tsingtao, and Canton, to give a few examples only, are important industrial communities, and it is equally urgent that labor regulations should be applied in them. It is thus essential that a general effort should be made to organize factory inspectorates in these industrial centers. This can hardly be done unless there is a Central Inspection Department at Nanking, which is the headquarters of the Government.

We brought this point to the notice of the Minister of Industries. As we have already stated, the first steps towards the creation of a Central Factory Inspection Department were taken even before we arrived in China, and before the Factory Act was put into force. One of the first acts of the Central Department was to organize courses at Shanghai for training factory inspectors for the various provinces and municipalities. We were able to see for ourselves how useful these courses were.

It was of course impossible to hope for very far-reaching results from a brief mission of a few weeks to so large a country as China, and we did not entertain any exaggerated expectations on that point when we left Geneva. We nevertheless consider that definite progress has been achieved, as a result of the measures taken by the Chinese Municipality of Shanghai and the institution of an inspectorate attached to its Bureau of Social Affairs, and also of the agreement of principle for the working of a joint inspectorate, which was accepted by the authorities of the various sections of the Shanghai district. The first steps will of course be only on a very small scale, but it could hardly be otherwise in a country where existing conditions of industrial labor are so far behind those of Western countries. Notwithstanding their hesitations, their reservations, and their appeals for prudence, the employers of the Shanghai district, generally speaking, adopted an attitude which allowed us to hope that a means of remedying the most crying abuses which have hitherto existed has now been found.

Chenju Wireless Station

The international wireless station in Shanghai, opened by the Chinese Ministry of Communications serves principally for short wave communication with the European and American continents. The station comprises three principal parts, the central office in Sassoon House in Shanghai, the transmitting station near Shanghai, and the receiving station in Liu-hong. The three plants in these places which are at some distance from each other, are interconnected in such a way that the actual service can be carried out directly and uninterruptedly from the head office in Sassoon House.

Chenju, where the transmitting station is situated, is on the railway line from Shanghai to Nanking and about 10 miles north-



Wireless station Chenju, China, equipped with an 80 b.h.p. airless-injection Sulzer Diesel engine.

east of Shanghai. The electric energy required for working this station is transmitted from Shanghai to Chenju at 6,000-volts. In case of a break-down in the power house of Shanghai or breakage of the transmission line, a two cylinder airless-injection Sulzer two-cycle Diesel engine of 80 b.h.p. has been installed as standby; it is direct coupled to a 60 kw. alternator and is ready to take up service at once if trouble occurs. All machines for generating electric energy and for pumping oil, water, etc., are installed in a building away from the transmitting station, so that any vibration from the machinery cannot affect the sender.

Hongkong Electric Company Installs Modern British Plant*

HONGKONG is justifiably proud of its electric light and power. The British Colony has two large electric companies, one providing for the needs of the island, including the city of Victoria, and the other coping with the rapidly growing wants of Kowloon and the new territory on the mainland, where developments have been most extensive in recent years. Not long since reference was made to the extension of the China Light and Power Company's equipment on the mainland and the large amount of British plant acquired for this purpose. Now it is the turn of the Hongkong Electric Company, Ltd., the undertaking which supplies the needs of the island, to receive attention.

The company originally operated from a site just off Queen's-road East, and gave the city of Victoria its first electric illumination just forty-three years ago. In those days the population was little more than a fourth of its present total, labor, coal and other requirements were cheap, and for an undertaking of modest dimensions and a problematic future the site was no doubt as good as any other at the time. For one thing, it was central, but as the years passed this advantage was discounted by its limitations. The concern prospered rapidly, and it became evident that a move would have to be made—the works were crowded in, and there was no more room for expansion. Faced with this problem, the directors finally decided to move from the heart of the city to North Point. There they have built the fine new power station which is illustrated in this article. The move was a bold one, for the land had to be reclaimed from the sea, but the company now possesses a site which will permit of all likely expansion for many years to come and at the same time will effect the important economy of direct transport of all coal and other needs from the ships in harbor. The plant installed when the transfer was made a few years ago is being superseded, and it is of the new plant, still in course of erection, that we would now speak. This plant, supplied by the Stirling Boiler Co., Ltd., of 32-33, Farringdon-street, London, E.C.4, is designed to modernize the power station and further economise by replacing the low-pressure with high-pressure steam plant.

The extension comprises two class O.L. 35/15 tridrum Stirling boilers, 35 tubes wide by 15 tubes deep. Each boiler has a tube-heating surface of 9,814 sq. ft. designed for a working pressure of 425 lbs. per sq. in., the evaporation of each unit being 75,000 lbs. of water per hour actual normal and 100,000 lbs. of water per hour actual overload. The front and rear steam drums are 22-ft. 3-in. long by 42-in. diameter, and 1.21/32-in. plate thickness, the mud drum being 19-ft. 4-in. long by 42-in. diameter and 1.21/32-in. plate. The total number of main generating tubes in the

boiler is 525, all 3½-in. outside diameter. The three rows nearest to the fire are 6 I.W.G. thick and the remainder 7 I.W.G. thick.

A superheater of the Stirling inverted design, self-draining and employing round headers, is installed between the first and second banks of tubes. It has an effective heating surface of 2,340 sq. ft., and is designed to impart a superheat of 322 deg. F., giving a final temperature of 775 deg. F. An economiser of the Foster steel tube type is installed with each boiler. This has a heating surface of 3,024-sq. ft., the feed-water temperature entering being 150 deg. F., leaving 254 deg. F. The temperature of gases entering the economiser is 690 deg. F., leaving 454 deg. F.; the draught loss through same being .92-in. water gauge.

An air heater of the Howden-Ljungstrom Rotary type is supplied to each boiler. The gas temperature entering this is 450 deg. F., leaving 275 deg. F.; air temperature entering 90 deg. F., leaving 300 deg. F.

The mechanical stokers are of the class "L" type, there being one stoker per boiler 18-ft. long by 17-ft. wide, giving a total grate area of 306 sq. ft. per boiler.

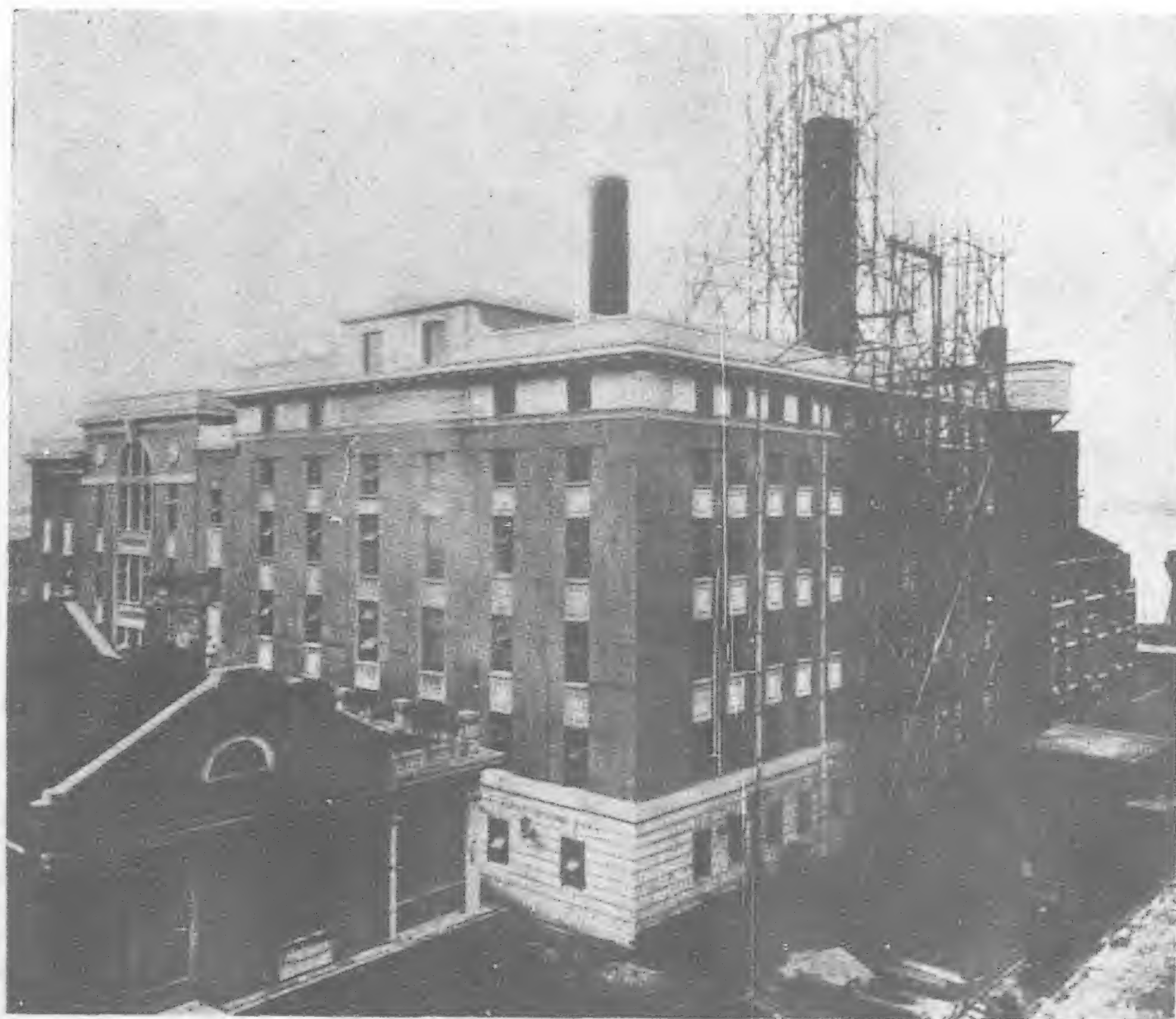
A steel chimney 9-ft. 4-in. internal diameter and 68-ft. 5-in. high is erected above the fan platform and takes the discharge from two induced-draught fans, one per boiler. The fans are of the Sirocco type, 60-in. diameter. Each is driven by a Lancashire dynamo Crypto, Ltd., motor, developing 220 b.h.p. at 725 r.p.m. The volumetric capacity of each fan is 82,000 cub. ft. per minute, water gauge 7.75-in., gas temperature being 275 deg. F.

The forced-draught fans, one to each boiler, are of Sirocco manufacture, 40-in. double inlet. They are driven by a Lancashire Dynamo Crypto, Ltd., motor, developing 93 b.h.p. at 725 r.p.m. The volumetric capacity is 48,800 cub. ft. per minute. To prevent emission of grit from the chimney, two shunt suction grit arrestors of the Sirocco type are installed to each boiler, these being situated on the suction side of the double inlet induced-draught fan, and

are complete with the necessary secondary collectors, to which trunks are fitted to discharge the grit into the basement for transportation.

Each boiler is supplied with a complete set of instruments mounted on a separate panel in the front of the boiler, so that the operator in charge has a clear view of the performance of the plant.

The boilers are erected on a sub-structure forming a basement 13-ft. deep, for the removal of fine ash, riddlings, etc. The riddlings, fine ash and grit from the grit arrestors are dealt with by means of ordinary trams, while the heavy ash and clinker discharged from the two



Hongkong Electric Company's Power Station at North Point

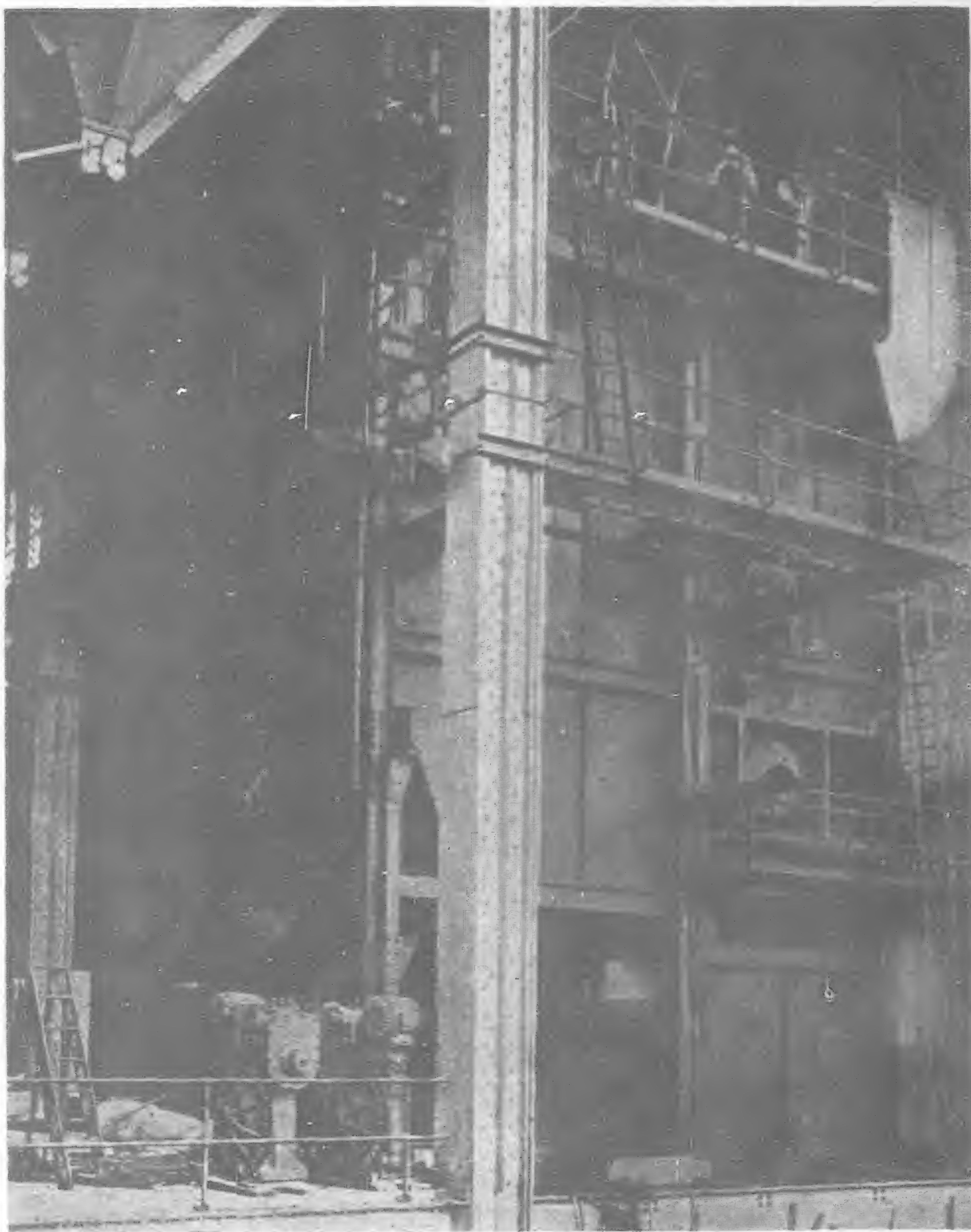
* *Eastern Engineering and Commerce.*

stokers are dealt with mechanically by an ash conveyor. Ash and clinker, after passing through a receiving hopper, fall into a tank containing water, in which is immersed a paddle wheel set at an angle to the horizontal. On revolving the paddle wheel, ashes are lifted to the top of the tank and discharged into a rubber belt conveyor, to pass along the length of the boiler-house for final disposal into an ordinary tram.

Soviet Oil Production

Recent new discoveries disclose that the oil fields of the Soviet Middle-Volga district are exceedingly rich. These fields were first brought to light in 1929 and 1930 near Syzran, Juguli and along the Sok River. The new discoveries show that oil is present in abundance and geological conditions are particularly favorable for exploitation. It is not yet possible to estimate the amount of oil in the soil of this district, but there appears sound reason to believe that the resources are immense.

More new fields have also been discovered on the North Caucasus where geological survey parties have been at work. One rich well has been developed near Benoe in an area where the



Stirling Boilers in Course of Erection

The longest period of continuous work hitherto achieved, in the U.S.A., was 118 days. In the north District on the shores of the Ukhta there are large layers of schist and rich wells. Twelve holes have been drilled there of which seven are yielding.

existence of oil has never before been suspected. The search for oil in Kuban and along the Black Sea shores has been successful and at present about twenty new wells are being drilled in Kuban. In the Anapa district it is reported that several new oil wells are spouting light oil and in Maikop oil production is to be increased to 20,500,000 tons annually.

In Sherdyn in the Urals drillings have given favorable results, as after penetrating through an exceptionally hard layer the survey party hit oil at a depth of 531 meters and found marked indications of a rich supply. Turbine drilling in the Baku oil district have proved satisfactory and highly productive. In the space of five months 5,440 meters were drilled in 1931 and by means of turbine drilling 10,470 meters were drilled in five months of the present year with the same number of machines working.

The cracking mill Vano Sturua in Baku has achieved a production of 125 days of uninterrupted work.

Brigandage in Manchuria

(Continued from page 305)

Service and published by Longman, Green & Company in 1888. There is also the more enlightening Semi-official document "Manchuria; Its People, Resources and Recent History" written by Alexander Hosie of H. B. M. Consular Service, published by Methuen & Company in 1901. Both books were written by unimpeachable authorities long before Manchuria came into touch with outside nations and long before the penetration of Japanese influence. Both books abound with references to brigandage, the curse of the country and refer to the frequent meeting with gangs of chained bandits on their way to execution at the provincial capitals.

In Kirin alone, Mr. Hosie says that over a thousand were beheaded every year.

There are other authorities on Manchuria who could be quoted on the prevalence of banditry and the activities of the Hunghutzes, amongst which must be mentioned the recent work of Owen Lattimore, entitled "Manchuria; Cradle of Conflict," published by Macmillan. This book is one of the most unusual studies of

China and at the same time the most valuable contribution to the origins of the present dispute that has yet appeared. No real conception of what it is all about is really possible without a knowledge of the background which Mr. Lattimore so brilliantly makes clear. What he has to say about bandits in Manchuria and Mongolia fully corroborates the reports of those who travelled through the country long before it came in touch with outside influences.

Banditry in Manchuria is endemic, chronic, one of the chosen professions. Manchuria is the very home of brigandage on a large scale, the proof being that one of these chieftains elevated himself to the supreme rulership of the province and created a dynasty, which the Japanese overturned.

The full force of Chinese propaganda is now being exerted to prove that banditry in Manchuria was sporadic and somewhat of the genial Robin Hood type until Japan's military intervention in September last made life and property insecure. The record refutes this statement.

Soviet Aviation Progress

SOVIENT airlines have shown a steady growth in recent years. Last year they totaled 44,900 kilometers, an increase of 55 per cent over the length of lines in the previous year. The distance flown in 1931 amounted to 7,000,000 kilometers, an increase of 19 per cent during the year. The number of passengers carried, which reached 23,000, gained 18 per cent, while the amount of mail transported was two and one-half times and the amount of freight half again as large as in 1930.

The first airline opened in the U.S.S.R. was the Moscow—Kovno—Koenigsberg line which was put into operation in 1922 by the Deruluft (German-Russian Aviation Corporation). In the following decade aviation progress was steady. Beginning with 1923 an extensive campaign was carried on in all republics of the country for the development of air communication. The increase in the length of airlines, however, was not very rapid until 1928, the network growing from 1,200 kilometers in 1922 to 5,250 km. in 1925, 11,422 in 1928, and then to the 44,900 km. reached last year. Of the latter figure nearly 9,000 km. were hydro-lines.

By the end of last year the program of 46,000 km., set for the last year of the Five-Year Plan (1933), had almost been reached. The U.S.S.R. is now second in the world, ranking after the United States, in length of airlines. This year it is expected that the length of lines will increase 22.5 per cent to 55,000 km. (34,150 miles), while the distance flown will reach 10,500,000 km., a gain of 50 per cent. It is estimated that the number of passengers will reach 40,000, almost double the total of last year, and that 2,000 tons of mail and freight will be carried, triple the 1931 figure.

Figures for length of lines, distance flown, number of passengers, and mail and freight carried by Soviet airlines in the last three years and the program for this year are as follows:

		Length of Lines	Distance Flown	Passengers	Mail	Freight
		—(kilometers)—				(metric tons)
1929	...	17,542	4,047,000	13,900	89.6	541.3
1930	...	29,281	5,889,000	17,800	143.8	206.4
1931	...	44,900	7,000,000	23,000	375.0	300.0
1932 (plan).		55,000	10,500,000	40,000	—2,000—	

Preliminary data drawn up by the State Planning Commission on the second five-year plan for aviation call for increases to 300,000 km. of lines by 1937, the last year of the plan. Airmail transport is to increase to 600,000 tons by 1937, or 40 per cent of the total mail of the country, while freight transported is to increase to 2.3 million tons. Special emphasis will be placed on long-distance flights, and it is estimated that passengers making such flights will constitute six per cent of the long-distance passenger travel by all means of transport (for distances of over 100 km.).

This year the following new lines are to be opened, among others: Moscow—Smolensk—Minsk (657 km.); Moscow—Briansk—Kiev (790 km.); Penza—Saratov (190 km.); Baku—Krasnovodsk; Magnitogorsk—Ufa—Kazan; Novo-Sibirsk—Semipalatinsk; Krasnoyarsk—Yeniseisk—Igarka. They make up a total of 4,882 km. of which 1,890 will be hydro lines. A number of short lines will be opened in the Ukraine, North Caucasus and other regions, with a total length of 5,000 km. One hundred and fifty flying fields are also to be built this year.

At the end of 1931 there were 41 airlines in operation in the Soviet Union. Of these some of the most important were the following: Six lines from Moscow to Leningrad, Khrakov, Stalingrad, Tashkent, Sverdlovsk, and Berlin; two from Leningrad, to Riga and Petrozavodsk; three from Kharkov, to Odessa, Berdiansk, and Sochy; from Tashkent to Krasnovodsk, Termez, Osh, and Alma Ata; from Stalingrad to Kuliab and Horog; Sverdlovsk to Magnitogorsk, Novo-Sibirsk and Novy Port; Irkutsk to Yakutsk and Vladivostok; Archangel to Siktikvar and Izhma; Tiflis to Sochy and Rostov; Nikolaevsk (Amur) to Petropavlovsk (Kamchatka); and Khabarovsk to Alexandrovsk.

The airline between Leningrad and Moscow, which is equipped for both day and night flights, was recently completed. The average time of flight with stops is four hours. These planes will carry up to eight passengers, besides mail and freight.

In the northern regions of the U.S.S.R., where six lines were operating last year, eleven more will be opened during 1932. The seaplane line, Vladivostok—Sakhalin—Nikolaevsk-on-Amur—Vellan, will connect all important points on the Soviet Pacific coast. In addition service on the following lines will be inaugurated: Moscow—Vladivostok, Nikolayvsk—Petropavlovsk, Nagayev Bay—Penzhino, Nagayev—Nizhni Kolymsk, Svobodny—Ekimchan, Alexandrovsk—Niisk—Okha, Vladivostok—Nikolayevsk—Kerby, Petropavlovsk—Vellan.

Rapid progress has been achieved in adapting all Soviet air lines to year-round service. In 1930 only one line operated throughout the year, but last year practically all lines maintained year-round service. Work is being rushed in connection with the construction of lighting apparatus over 60,000 kilometers of airways in order to make night service possible.

Considerable progress has been made in designing and building new types of planes. The Civil Aviation Scientific Research Institute completed last October the first all-steel, electrically-welded plane, known as the "Steel-2," which is made of stainless steel. Trial flights showed it to be well constructed, and immediate steps were taken by the aircraft industry to organize mass production. Other new developments are in the field of large passenger planes (the ANT-14 for 34 passengers), autogiros and dirigibles.

The Leingrad Scientific Research Institute for Aviation has completed preliminary detail drawings of an all-metal airship, with a capacity of 8,000 cubic meters. The ship is to be 160 feet long, and is to have a 540 horse-power motor, which will develop a speed of 115 kilometers (72 miles) per hour. It will carry freight, other than that needed for its own operation, weighing 2,650 kilograms. The outside of the body is to be constructed of a special aluminum alloy known as "kolchug."

Gold Strike in the Philippines

THE Big Wedge Mining Company, operating the Antimok properties in the central group near Baguio, has reported one of the most sensational gold strikes in Philippine history. Samples of ore brought to Manila show a remarkable assay value for straight commercial ore, running at least \$2,000 to the ton. Several specimens rate actually as high as \$3,000 to the ton.

The discovery was made by Arthur Doe, a mining engineer from San Francisco, in the course of an inspection of the properties.

The Big Wedge Mining Company is making plans for the establishment of mills and the necessary machinery for large-scale operations. At present lateral development is being pushed vigorously in preparation for the prove-up and the installation of a reduction plant.

The new discovery was made at the bottom of a winze at the lowest point in the operations. However, a new cut is planned considerably below this in the hope of tapping the vein at a lower level. Recent improvements in transportation and communication have given the Baguio district increased accessibility, which, coupled with this development, induces the belief that the Philippine mountain provinces are destined to become the greatest gold-producing center in the world.

The Big Wedge Mining Company was organized by E. J. Harrison, a Manila resident, purely as a local corporation, representing \$1,000,000 capital and approximately 1,000 stockholders. The concurrence of this strike with increasing production in other properties opens the mining year with the greatest optimism.

South Africa last year produced nearly five times as much gold as its nearest competitor, Canada, and nearly sixty times as much as the Philippines, which ranked tenth. Except in rare instances in placer mining, gold assays only a few ounces to the ton. Last July deposits were reported near Reno, Nev., assaying as high as \$6,000 to the ton.

Gold Mining and its Vital Importance to Manchuria

World's Annual Production of Gold Valued at \$400,000,000 Manchuria's Annual Production \$2,500,000 or 1/160th of World's Total

By G. T. EVE, A.I.M.M. Late Chief Mine Geologist, Lena Goldfields, Ltd.

It is a common error to assume that gold mining is a simple operation requiring no special skill or capital but consisting merely of the not too complicated process of digging auriferous gravels and rocks and separating the gold from them. In actual practice, gold mining is a highly specialized industry demanding expert knowledge, experience and large capital.

It is true that in its initial stages gold mining, when conducted on rich, easily mined creeks or outcrops, may be pursued, without any special skill or investment of large capital, by the application of hand-working methods or some simple, crudely constructed machinery but on the exhaustion of such easy diggings the industry in the area in question will dwindle and even may stop altogether unless sufficient capital and the employment of very complicated technique and highly trained specialists are called in to save the situation.

The gold mining industry in Manchuria is passing through its childhood which, unfortunately, has been marred by lack of proper care and nourishment. This lack of proper care is expressed in the inadequate, complicated and inefficient mining laws and administration and the lack of nourishment is expressed by the absence of sufficient capital and properly trained personnel. The industry is not only passing through a precarious childhood but it is further menaced by a disease known as "arrested development" which may result in very grave injury to the growth of the industry. The following figures will illustrate my statements:

The annual output of gold in Manchuria, expressed in gold dollars, during the years stated, was approximately:—

1926 ...	G. \$4,600,000
1927 ...	G. \$3,400,000
1928 ...	G. \$2,700,000
1929 ...	G. \$2,500,000

From these figures it will be noted that Manchuria's gold mining industry, never too robust, has shown a progressive decrease in its production during the four years mentioned. What are the reasons for this?

The Northern Manchuria goldfield is the natural continuation of the geologically termed "Amur Region Auriferous Belt" and comparison between the working conditions and mining laws in that belt and in Manchuria will assist in understanding and solving the problems with which the industry is confronted in the latter

country. The mining laws in the Amur Region (I refer, of course, to the period prior to the advent of the Soviet form of government since when no private mining has been permitted) were based on moderate taxation, freedom to obtain claims and the security of all those granted, practically no government royalties levied on the gold won, a comparatively high tax on land surface and a fixed minimum output from each claim. Above all, these laws were rigidly enforced.

Some Comparisons

The inadequate mining laws which exist in Manchuria appear to have been based on excessively high taxation and heavy royalties without providing any protection against inflation of areas by so-called "blanket agreements." Moreover, the complicated and slow procedure of registration of claims and the general lawlessness are factors with which the prospective operator has to contend. The result is that the Amur Region, prior to the Russian Revolution, produced an annual average of output of gold valued at some G. \$15,000,000 and directly employed in the gold mining industry approximately 50,000 men together with hundreds of engineers and skilled mechanics, whilst in Manchuria the output of gold before the Russian Revolution was insignificant and in 1926 reached only about G. \$4,600,000 in value dropping to G. \$2,500,000 in 1929 when the total number of men employed in the industry did not exceed 16,000 with practically no highly trained personnel at all.

It is not my object to take the Amur Region as an illustration of mining conditions as they ought to be—far from it. I mention that region as an example simply because it and Northern Manchuria are, geologically, one auriferous belt and the conditions there, though very backward, were far in advance of those ruling in Manchuria.

As regards capital investment and output: a sum of approximately G. \$50,000,000 was invested in the Amur Region whereas in Manchuria, though the total sum is unknown, it was and is certainly very small. Taxation in the Amur Region, including levies of all descriptions, did not exceed 8% of the total value of the gold produced whereas in Manchuria taxes and other charges upon output amount to over 30%.



From the Map of Professor E. Ahnert. Area Enclosed in Black Line Shows Auriferous Districts; Scale 1: 10,000,000

In the former region even comparatively poor alluvial deposits returning, say, G.\$0.20 per cubic yard were actually operated owing to the more favorable conditions ruling there but in Manchuria no mines can be developed unless they produce not less than G.\$0.40 per cubic yard. In the Amur Region the gold mining industry was gradually passing from the primitive stage to mass production with the progressive use of machinery whereas in Manchuria no modern mechanical methods are adopted for the extraction of gold. The output of gold per man in the Amur Region averaged G.\$305 per annum while in Manchuria each miner produces less than G.\$235 per annum. It is, moreover, very important to note that in the Amur Region the gold mining industry, notwithstanding the more favorable conditions, laws and taxation, returned to the investors only about 4.7% average profit on their investment. This proves that the Amur Region with a lower rate of taxation was able to operate and produce gold from comparatively poor mines and **herein lies the key to the prosperity of the gold mining industry in any country.**

We who are specialists in this class of mining know that rich mines are few. The great majority of the world's gold mines consisting of so-called low grade ore are poor but from that poor majority comes the bulk of the world's gold. This is an all-important fact which should never be overlooked. High taxation and inadequate laws do not allow poor mines to be operated; moreover, the working of poor mines requires a large output and capital which latter, naturally, will not be found for investment in countries where the taxation is high and the laws unsatisfactory and where such conditions exist the rich mines only will be worked and then in a wasteful manner with the object of taking out gold by the easiest and quickest methods and on the exhaustion of these rare rich deposits the country will find itself in a backwater as regards further development of the industry.

A Suggested Policy

In support of my statement that rich mines throughout the world are rare, I would here say that in the Amur Region they amounted to only 4 per cent of the total mines in operation.

Specialists know from investigation and practice that the North Manchurian gold deposits are the results of the same geological influences and conditions which caused the Amur deposits and we may safely conclude that the same ratio of gold may be found in the one as in the other area.

The well-known geologist, Professor Anher, in his book on "Minerals of Manchuria" gives a tentative estimate of the gold reserves in Manchuria as approximately G.\$2,300,000,000. Taking this figure as a basis we find that 4 per cent, the percentage of rare rich mines, gives us G.\$92,000,000, 30 per cent of this sum, the amount levied heretofore in taxation in Manchuria, gives G.\$27,600,000. If Manchuria adopted wise and fair mining laws and taxed this most important and essential industry in a manner beneficial to the government and the community, say on the basis of a 5 per cent levy on the gold won, it would mean that practically all the poorer mines could be operated, that a tremendous influx of capital for investment would follow and **that on the exhaustion of the above reserves Manchuria would have handled gold to the value of Gold \$2,300,000,000 instead of Gold \$92,000,000 and that in direct taxation the government would reap the sum of Gold \$115,000,000 instead of Gold \$27,600,000.** These figures of course are tentative but they serve well to illustrate the vital importance of the very essential point I must make clear to the government.

The importance of the gold mining industry, properly financed and conducted, lies not only in the amount of taxation collected by the Government which is a consideration of very minor importance. It is of much greater import that the gold reserves of the country shall be developed and recovered and in the process the indirect benefits to the Nation, such as the consequent development of general trade, the construction of ways of communications, the employment, direct and indirect, of vast numbers of men, the development of allied industries, the increase of wealth and the advance of technical and general education, are of even greater advantage than the direct benefits.

The country which wants to be strong, virile and independent must have its industries developed, large cadres of highly skilled engineers and artisans and large reserves of gold. If that country is fortunate enough to possess auriferous deposits its surest and

quickest way to achieve greatness would be to develop its gold mines. But in this achievement, that country must have adequate laws firmly enforced and never tax its growing industries more than is absolutely necessary. In fact, at the beginning, its basic industries, such as gold mining, should bear practically no taxation. Canada, the United States, the South American Republics and other countries of recent growth and development have thoroughly understood this essential factor with the result that the mining industry in these countries is taxed extremely lightly and in consequence they have reaped tremendous benefits and have flourishing, healthy industries. In Australia the Government grants a bonus, in addition to the actual price paid by it for all gold won, for each ounce of gold mined.

There is still another important point that requires elucidation: most of the gold produced in the world comes from reef mines. Alluvial mines never have contributed largely to the world production. In the United States only 19 per cent of the present output is recovered from alluvial deposits. The Transvaal, where the mines are responsible for half of the world's gold, has no alluvial mines, all of the production coming from reef mines. Gold was extracted solely from alluvial deposits only in the early initial stages of the industry the development of which resulted in the operation of reef mines, which form of mining entails the handling of a very large tonnage of ore and the investment of large capital in addition to the introduction of highly complicated and technical processes.

Gold mining in the Amur Region belonged to the initial stages of the industry and its gold came entirely from alluvial mines, the G.\$50,000,000 of invested capital was producing gold at the rate of G.\$15,000,000 per annum or at the rate of G.\$0.30 for every dollar invested.

The total capital invested in the reef mines in the Transvaal amounts to approximately G.\$175,000,000 and the mines are producing at the rate of some G.\$220,000,000 per annum or at the rate of about G.\$1.25 for every dollar invested and the Transvaal mines are working ore which, in Manchuria, would be impossible to operate under present conditions.

What Should be Done

From this last example we can arrive at one most important deduction: if Manchuria decides to develop its mineral reserves, as it must do in order to become powerful and wealthy, the government must take steps to invite foreign capital to participate in that development, that is, the country must borrow capital. The Government, as the representative of the community, must see to it that this borrowed capital is utilized for the greatest benefit to the community as a whole. We have seen that reef mines produce, per dollar invested, nearly four times as much gold as alluvial mines but reef mines require large capital and a highly efficient organization whereas alluvial mines need comparatively small capital and less efficient personnel and organization. Therefore the Manchuria Government should invite foreign capitalists to invest in reef mining giving them every facility and help as this form of gold mining development **is of the utmost importance to the future of the nation.** Preference should then be given to domestic capital to operate, by hand-working methods, the alluvial deposits which are not suitable for operation by machinery—those alluvial mines which require mechanical operation and, hence, a comparatively large amount of capital should be grouped, for the purposes of development, with the reef mines.

Mine owners the world over, and particularly in Manchuria, are prone to exaggerate the importance and value of their own mines. Almost invariably this exaggeration is entirely without foundation and is generally due to greediness but it forms an insurmountable barrier to people wishing to invest money in the proper development of the mines. The practice of the late Government and among the mine owners is to demand fifty per cent of the profits from the operation of mines by foreign capital and experts, though at times 30 per cent has been demanded. It is, of course, out of the question for foreign investors to consider advancing money on these terms and no serious people really interested in the mineral development of Manchuria would respond.

Persistence in such terms is largely due to ignorance and an exaggerated idea of the value of the mines together with an entire lack of knowledge of up-to-date technically scientific mining.

(Continued on page 329)

Gold Mining in Soviet Russia

By L. SHLOUNDE, M.Sc., F.C.S. M.I.M.E.

As a result of long personal experience in mining and metallurgical industries in South and West Africa, Russia and Siberia, Mr. Shlounde is well qualified to describe the gold-mining and metallurgical possibilities of Soviet Russia

GOLD is found in the Urals, Caucasus, Western, Central, and Eastern Siberia and in many other parts of Russia. Before the Great War Russia ranked fourth amongst the gold-producing countries of the world.

The principal gold-mining districts are the Urals, Lena district, Far Eastern district, Altai-Marinsk, Kazak A.S.S.R., Angaro-Baikal district, Yakut A.S.S.R., Maritime-Priamoursky district, Uzbekistan, and Turkmenistan districts, Archangel and several districts in the Caucasus.

The Ural gold-mining region is situated in the provinces of Perm, Orenburg, Viatka, Ufa and Turgai and represents the oldest gold-bearing region of the U.S.S.R. Gold was discovered there in 1742 in the Beresovsky gold mines, near Ekaterinburg (now Sverdlovsk). In 1771 alluvial gold was discovered in the River Chussovoi. In the neighborhood of Sverdlovsk in the Governments of Perm, Tobolsk and Orenburg, there are a number of gold-fields, which border on the Ural Mountains and which spread out in a wide plain from north to south and extend for hundreds of square miles. The gold areas start north of the Urals in the basin of the River Soswa and extend to the South Urals close to the Mugodjar Mountains. The gold strata of the alluvial bed are not deep and in their yield and extent are inferior to those of Siberia.

They have largely already been exploited and many of them are exhausted. The gold territories in the districts of Bogoslov, Nishni-Tagil, Naviansk, in the valley and rivers Novia, Eltschanka, Miassa and Kotschkar system, Shigirsky Lake and Langur-Ekaterinsk region in the valley of Kanatz and Shulgatan rivers are the principal territories giving the Ural Mountains the reputation of a gold-bearing country. Up to now, the largest amount of capital has been invested in the treasures of the Ural Mountains. In the pre-war period many Belgian, French, German and English groups took over various grounds and numerous expeditions were made.

The inexhaustible wealth of these mountains in precious metals and minerals is well known through research work which has been carried out by well-known firms, savants and engineers.

Although the Urals have been known for more than 200 years, only a small portion of their mineral deposits has as yet been worked. The average pre-war annual production of the Urals was about 10,500 kilogrammes of gold and 4,000 kilogrammes of platinum, or 326,000 ozs. of gold and 128,000 ozs. of platinum, of the approximate value of £2,000,000 gold and £1,500,000 platinum. In 1913 the official output of gold was about 232,176 troy ozs. of the present value of £1,393,056.

It is most important to know that in accordance with official information given by the eminent authority of A. K. Meister on the mineral resources of the U.S.S.R. (published by the Geological Committee of the U.S.S.R.) the reserves of alluvial gold are estimated at 98,630 kilogrammes of gold of the approximate value of £20,000,000. This represents only a portion of a half-a-dozen gold-bearing regions. There are numerous gold-bearing conglomerates, similar to the South African formation in the Bogoslov region, containing from four to 12 grammes and more per ton of ore.

Other original gold reefs are situated in numerous parts of the Urals. It should be noted that up to the present neither the southerly nor the northerly parts have been exploited.

The output is relatively small, because, where workings have been made, gold has been obtained by primitive means. Gold on the Urals now as before is worked mostly by individual labor; auriferous areas are leased to so-called "Starateli" contractors of private enterprise to exploit, or on license to individual diggers, without a lease on the land.

Undoubtedly under modern conditions and with modern machinery and greater metallurgical knowledge the immeasurable wealth of these mountains will be brought to light as important producers in the gold-mining industry.

In connection with the organization of the All-Union Trust "Soyus-Zoloto," the production of gold (to which considerable

attention has already been given by the Soviet Government) will increase in output and new fields will be opened for exploitation.

If we take into consideration the erection of the wonderful new town of Magnitogarsk, as a metallurgical center in the Urals, the latest achievements of the Soviet Government and of the great creative energy of its population, the railway in the Urals, of which 1,500 kilometers have already been laid, we can easily see that the future industrial progress of the Ural goldfields is assured.

West-Siberian Gold-bearing Regions—Tomsk

After describing gold mines in the Urals, which is known as the oldest gold-bearing territory in the Soviet Union, I propose to turn to the Western District of Siberia. The goldfields of the Province of Tomsk, the mining districts of Mariansk, Briansk and Kusnetzsk were in pre-war times private Crown lands, but have now been nationalized. Concessions can be obtained from the Soviet Government. Gold-mining has been carried on in a very primitive manner, but, nevertheless the workings proved highly productive. The alluvials in this district are very rich, and the mineral veins frequently contain from 20 to 33 grammes of gold per ton. The Trans-Siberian Railway, which runs through this province, and the coal beds which are in the proximity will promote and greatly facilitate the development of the mining industry.

The Altai-Marinsk Gold-bearing Region—Altai

Equally important are the gold beds of the Altai Mountains, Atschinsk and Minusinsk. The gold strata, which are from two to three meters thick, are spread out over a wide surface. The geological formation of the gold strata in the Altai Mountains is characteristic through the greenstone, hornblende, diorite, syanite, also limestone, granite and clay-slate.

In the Altai-Marinsk region of the district of Bisk and of the autonomous Province of Oriat, the gold alluvials are situated in the river systems of Toma, Kondoma, Balik-cu Lebed, Bia and other systems of many rivers. Up to 1923 the production of gold obtained in this region was 220,170 kilogrammes. In the district of Mariinsk gold is obtained not only from alluvials, but from gold-ore from reefs in the Altai Mountains, such as the gold-mines of Zmeinogorsk, Riddersk and Zeirianovsk. In the district of Egorevsk in the basin of Ika and Suengi Rivers, gold has been extracted from N-E ridge and in the valleys of the rivers are numerous working placers for dredging enterprises. In many other regions are very large reserves, Kuznetzki-Altai is the principal gold producer. Up to 1917 its production amounted to 142,920 kilogrammes of gold. The most productive districts are on the Rivers Mrassa, Kondoma, Balyk-Su, Lebed and others, where 72,000 kilogrammes of gold have been extracted and there are large reserves in store. The basin of River Kii is a most important field for exploitation. Up to 1922 49,440 kilogrammes of gold have been recovered and reef gold-mining is its future. In Zmeinogorsk there is hornstone very rich in gold content. The navigable river Yennissey, the Trans-Siberian Railway and the abundance of labor, are great assets for the future development of gold mining in the Altai gold region.

Yennissey River and Irkutsk Gold-mining Region

The Yennissey goldfields are situated in the district of Krasnoyarsk and Atchinsk. They are some of the oldest known Siberian gold placers. In the neighborhood of Atchinsk gold was discovered in 1832. Abundant wealth lies in the Province of Irkutsk, on the right side of the Yennissey River in the Mountains of Syriam. On the Rivers Niabe, Kolamy, Narkosowka, Talia and Uderey, the ground is highly mineralized. The gold strata are very regular and the numerous coal beds which are situated there are naturally of great importance. The geological formation of the gold-bearing

strata is metamorphic slate and clay slate, which are superseded by mica-slate gneiss, diorite and porphyry limestone, conglomerate and alluvials. The gold bed is from three to five meters thick and contains from six to 10 grammes of gold per ton. These alluvials adapt themselves to dredging. Up to 1923 the production in the Yennissey region was 558,080 kilogrammes of gold, equal to 20 per cent of the total production of the U.S.S.R. The gold-bearing alluvials are mostly situated on the right tributary streams of the River Angara and the left tributaries of Tunguska and Pit Rivers, which divide the whole region into north and south systems of gold territories. The south system of goldfields stands out for its high gold contents. The alluvials in the upper part of the Rivers Uderay and Bolshoi Marojney (of 30 per cent), and in the north system the alluvials of Kalami, Sevaglikone Aktolika, Wangascha Rivers and others (of 70 per cent) are of very great importance. In the South Yennissey district are the gold-mining reefs of "Gerasimo-Fedoroff," "Ural," "Kommunar," "Seralinsk" and "Soviet" gold-mines.

Angaro-Baikal Gold Region

In the Irkutsk district of Central Siberia are the gold districts of Burisinsk, Pre-Baikal and the North Slope of the Mountains of Sajan. The Burisinsk district is eminent for its striking richness. Up to 1917 the gold production was 36,090 kilogrammes, leaving a reserve of 18,300 kilogrammes of gold. The gold industry there was concentrated mostly in the district of the River Nurioundukan and on the River Krestovka, a stream of the Baikal Sea. The district has great mining prospects, as also has the whole western country of the Baikal Sea.

The Lena Gold-mining Region

In the Lena region gold was discovered in 1846 and in 1860 the very rich alluvials of Boidabo produced 56 per cent of the gold recovered in the district. The alluvials on the river systems of Neigri and Vachi produced 30 per cent of the gold of the district. The River Vitim and its tributaries contain also very large alluvial goldfields. In 1915 the production of the Lena district was 17,263 kilogrammes (or 552,416 ounces troy), of gold. Up to 1923 the output of the district was about 600,788 kilogrammes (or 19,225,116 ounces troy) of gold, equal to 21.8 per cent of the total production of U.S.S.R. The whole region of the Lena goldfields is still very rich in gold and the Taiga (the vast marshy forests) have not yet been explored.

The Far East Gold Regions

Next to the Lena region in production of gold is the Far East region, which represents the Trans-Bakalien (Buriat Autonomous S.S.R. Amur Provinces, Premorski (Maritime) Province and Kamchatka. The principal ones are the Trans-Baikal and Amur regions.

The Trans-Baikal region is situated in the district of Bargusinsk, Nerchinsk. The principal alluvials are on the Rivers Ingod, Onon, Shilki and Arguni. There are large reserves. In 1917 the reserves consisted of 15,750 kilogrammes of gold. A characteristic of the gold alluvials in this district is the presence of large nuggets of gold.

The Amur region is situated on the Amur River and its tributaries, Zea, Selendji and Burea. Up to 1923 the production of the Amur region was 281,679 kilogrammes of gold, or 9,013,728 ounces troy, presenting 10.25 per cent of the total production of U.S.S.R. There are in Jedrinsk placers many quartz veins of thirty, one hundred and up to two hundred grammes to the ton of ore. On the River Chargu Chudger and many others are gold quartz veins exposed with abundant reefs of visible gold. There is the so-called "Golden Mountain" where quartz veins exist disseminated with heavy gold. Some of the alluvials are worked out, but large reserves are still available for exploitation.

The Maritime or Pre-Amursky Kaii Region

This region is the Province of Nikolaievsk and is situated on the system of the river Amgun. Up to 1923 the production of this district was 51,660 kilogrammes of gold. In the alluvials of Udelsk and Limuresik the gold reached 90 grammes per ton. The gold-bearing "White Mountain" is famous for large gold findings. In the gold-mines of Askold Island, in 1898 to 1923, 800 kilogrammes of gold were recovered from its quartz veins, some parts of the veins proving to be by assay 500 to 1,000 grammes per ton. There are large reserves on this island.

Kamchatka region is also very auriferous. Up to 1919 the production of gold was 1,376 kilogrammes of gold and there is a large reserve of 10,400 kilogrammes in store. The country is very little known, not having been explored but some prospectors proved the presence of rich gold-bearing alluvials on many rivers. On the Chukatzu Peninsula, American prospectors recovered ground on the River Nado, containing 15 grammes of gold to the ton and nuggets of 136.5 grammes. The region of Kamchatka is similar in geological formation to Alaska.

With regard to Trans-Bakail and Amur gold regions, I must add that the whole district of the river basin of Shilka and Arguni, Onon, Zeija, Oldai, Bureia and Amguni which are situated on the railway line of Tschita, Nertschinsk, Blagovestsensk, Nikolayevsk and Chabarovsk is highly mineralized and is abundant in gold alluvials and gold veins. From a geological standpoint it would appear probable that the Yablonovoi Chrebet Mountains situated there, which run through the whole district from north to south, are a continuation of the Andes, the richest gold-containing belt of the world, of which the other termination is in Patagonia. The geological construction of the gold containing ground in the Amur district in the river beds, consists of horneblend, gneiss and slate. The gold-bearing strata of the mines in the Amur are very favorable for exploitation because they lay at no great depth.

Yakutsk Gold Region

In the Province of Yakutsk are situated the richest goldfields of Siberia. These territories up to the present are still virgin ground. The geological formation of the rich gold river beds of the Alokma and Vittim are granite and syanite, superseded by gneiss and lastly by mica, chloride of lime and clay slate. The richest part of the province so far known is the celebrated Alokina (which is one of the richest gold-mines in the world), the gold strata amounting to 15 and 20 feet with gold value from 15 to 30 grammes per ton. It is possible to produce up to 15,000 kilogrammes of gold per annum there. No railway has yet been built in this region, but the construction of one in the direction of the Stanovoy Mountains should only be a question of time.

Having described briefly the principal gold districts in the Urals and Siberia, I should like to give a general survey of the state of gold-mining production in the U.S.S.R.

Exploitation and Production

The following statistics show the entire production of the gold-mining industry in Siberia for the period from 1882 to 1932, and the total production for half-a-century. A comparison is also shown between production in Siberia and the Transvaal.

The Entire Gold Production in Siberia

Year.	Kilograms.	Year.	Kilograms.
1882	31,200	1891	39,082
1883	25,733	1892	43,298
1884	35,531	1893	44,734
1885	33,018	1894	44,964
1886	33,436	1895	39,875
1887	34,861	1896	52,333
1888	35,168	1897	36,220
1889	37,748	1898	37,277
1890	39,377	1899	38,240

Total production for the above period in Siberia: 692,045 kgs.—22,145,440 ozs. troy. Value £132,872,640.

Total production during the same period in the Transvaal, 22,309,630 ozs. troy. Value £133,859,780.

The average production of Siberia from 1900 to 1908 was 41,200 kgs. The average production of Siberia from 1908 to 1912 was 7,250 kgs., or total 232,176 ozs. troy.

Gold production in years:

Year	Kilograms.	Year.	Kilograms.
1913	6,175	1926	93,600
1921	11,952	1927	102,000
1922	25,200	1928	105,000
1923	48,800	1929	115,000
1924	61,200	1930	122,000
1925	82,800	1931	125,000

(Continued on page 320)

Kuala Kangsar, Perak, F.M.S. Gets New Power Station

THE activities of the Perak-Hydro Electric Power Co., in installing a large hydro-electric plant on the Perak River and covering a large area in the State of Perak with overhead transmission lines are too well-known to require further description.

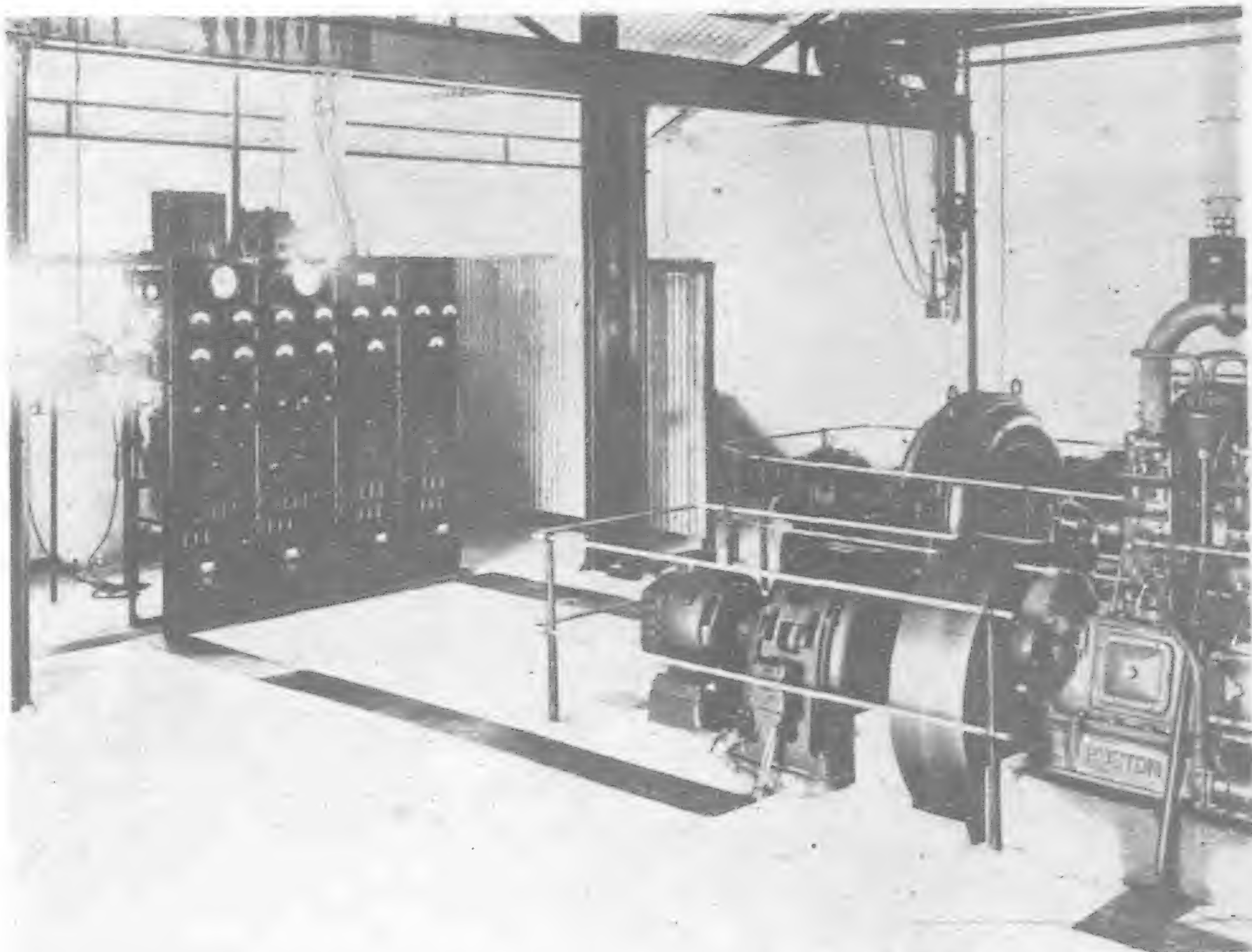
The activities of their subsidiary company, the Kinta Electrical Distribution Co., though equally important in their way, are less well-known and we therefore propose to give a brief description of their work in general and their latest installation at Kuala Kangsar in particular.

The usual procedure in supplying current to the many small towns in Perak is for the Perak-Hydro to carry a high tension line to the outskirts of the town and from there the K.E.D. Co. take over and carry out the laying of street mains, house and factory connections, see to revenue collection, and the thousand and one details in connection with a town supply.

When the town of Kuala Kangsar was to be connected a difficulty arose in that the town lies some distance from the nearest high tension line and the load did not warrant the expense of a line of the length necessary.

Consequently it was decided to instal oil engine driven generating sets until such time as the load warrants bulk supply, when the oil engine plant can be removed to another town and a similar process repeated.

The whole of the contract for the power house and plant was entrusted to United Engineers Limited, Ipoh, with the



Switch-board and 50 kva alternator supplied by the General Electric Co.

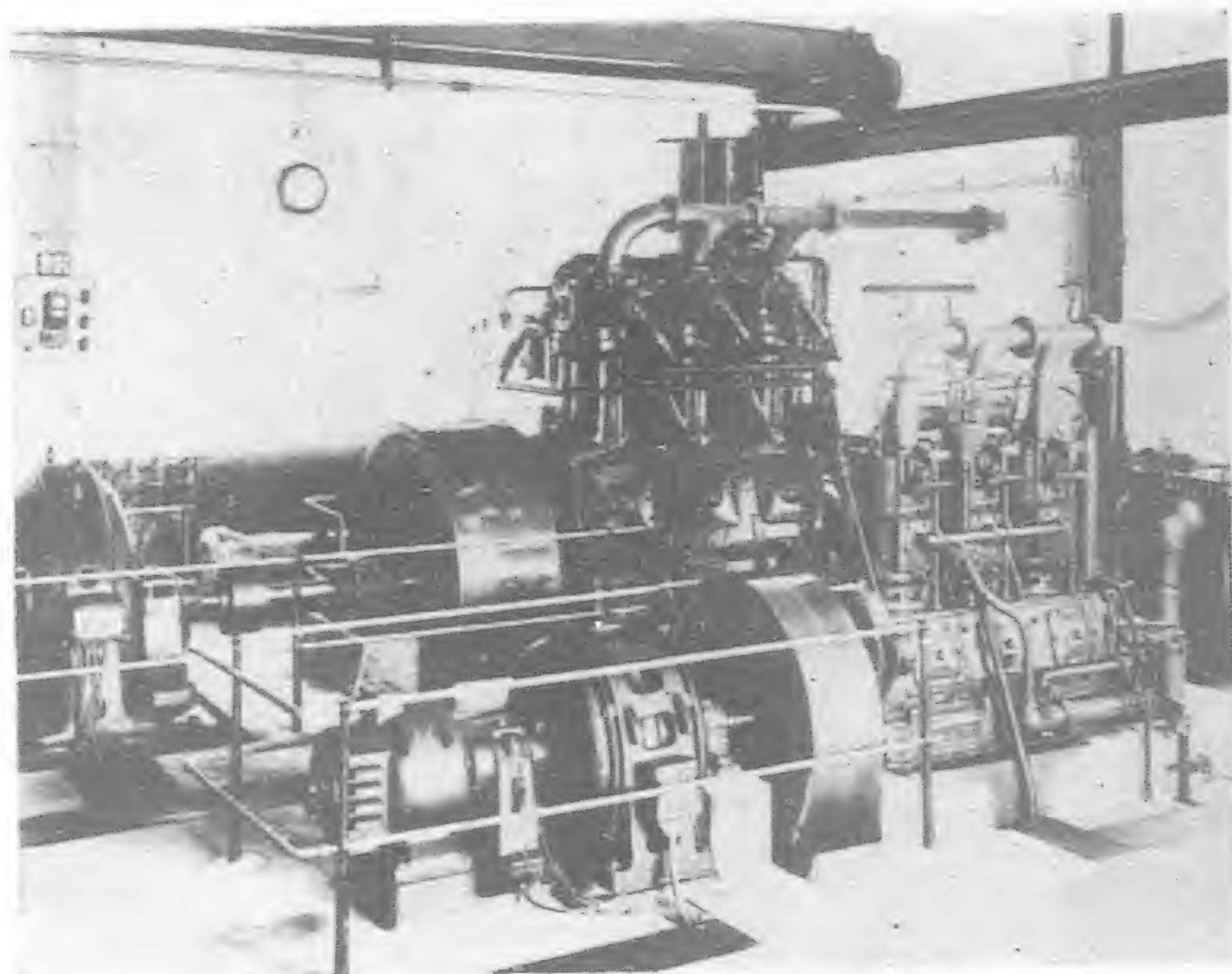
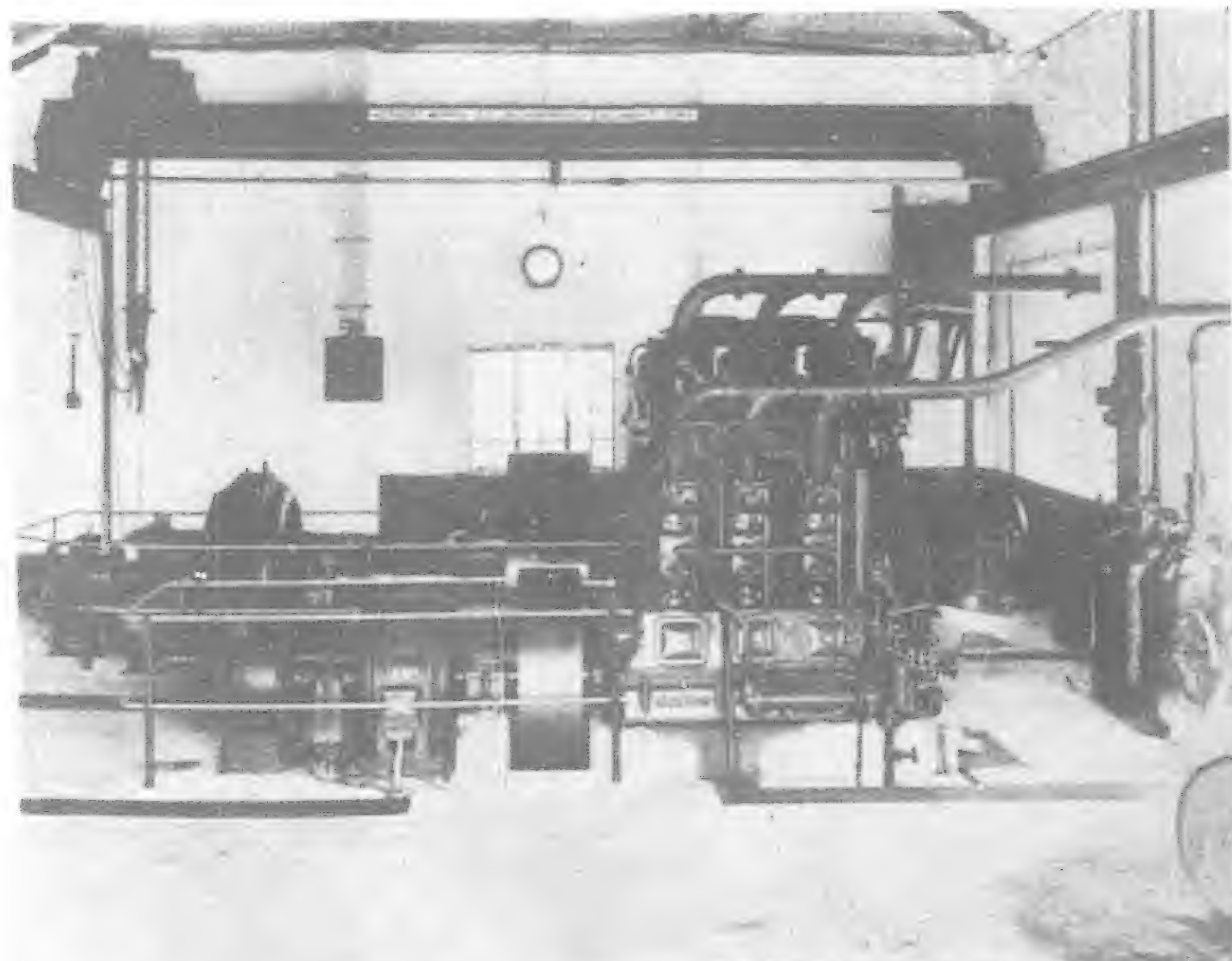


View of the power house with artificial load tank outside for test purposes.

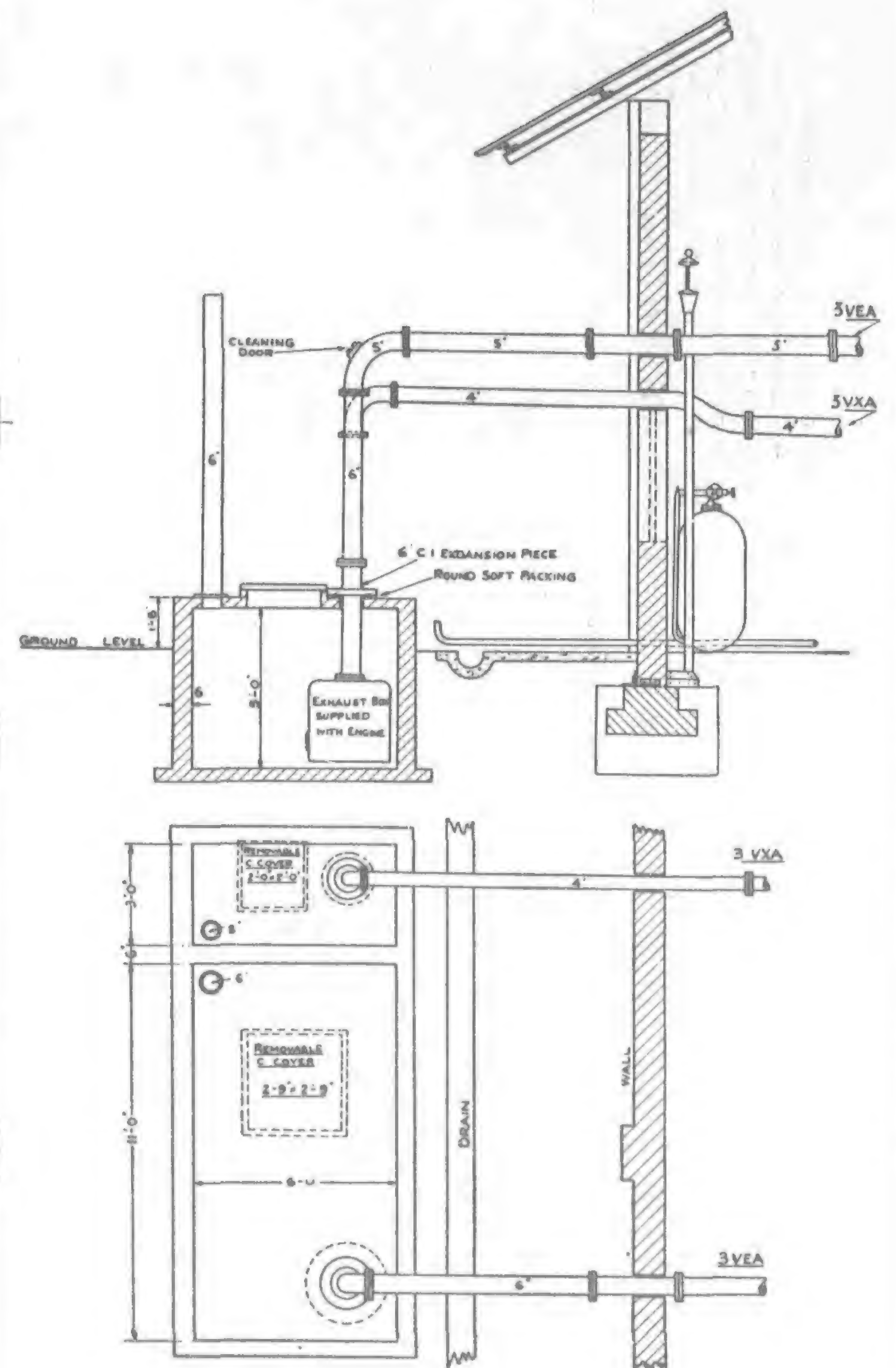
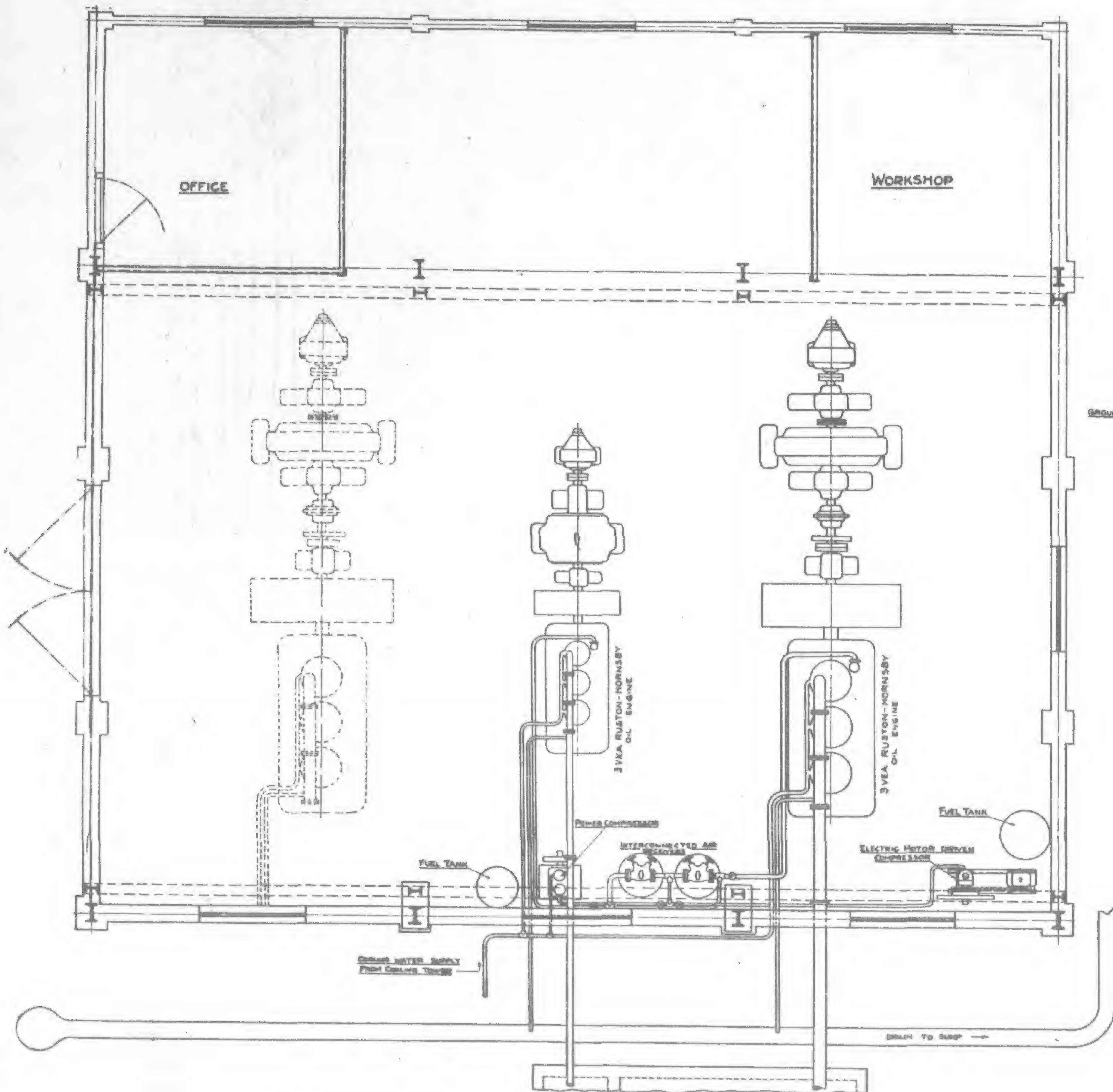
exception of the switch-board and the 50 kva. alternator which were to be supplied by the General Electric Co.

The plant comprises one three cylinder vertical airless injection engine developing 150 b.h.p. at 300 r.p.m., and one three cylinder engine of similar type developing 67 b.h.p. at 500 r.p.m., both being products of Ruston & Hornsby, Ltd., Lincoln, England.

The larger engine is direct coupled to a 125 kva. 440-volt alternator by Crompton, Parkinson Ltd., while the smaller engine is direct coupled to a 50 kva. 400-volt alternator by the General Electric Co., Winton, England.

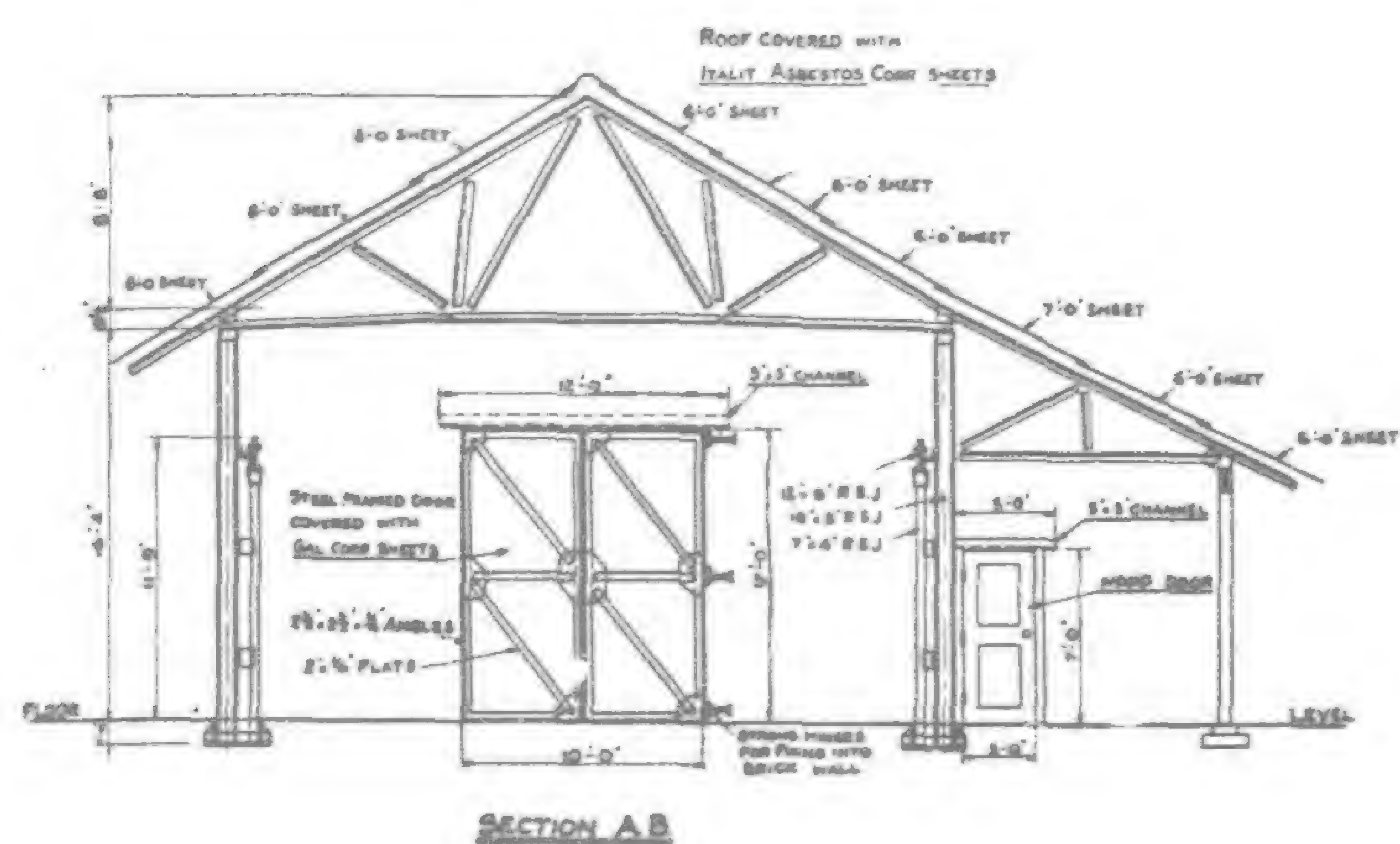


General view of the Generating Plant. One three-cylinder vertical airless injection engine developing 150 b.h.p. at 300 r.p.m. and one three-cylinder engine of similar type developing 67 b.h.p. at 500 r.p.m. both products of Ruston & Hornsby, Ltd., Lincoln, England. Note lubricating oil cooler on side of small engine



DETAILS OF EXHAUST ARRANGEMENTS

ELECTRIC GENERATING STATION
KUALA KANGSAR
FOR
KINTA ELECTRICAL DISTRIBUTION CO. LTD
SCALE $\frac{1}{2}$ " = 1 FOOT

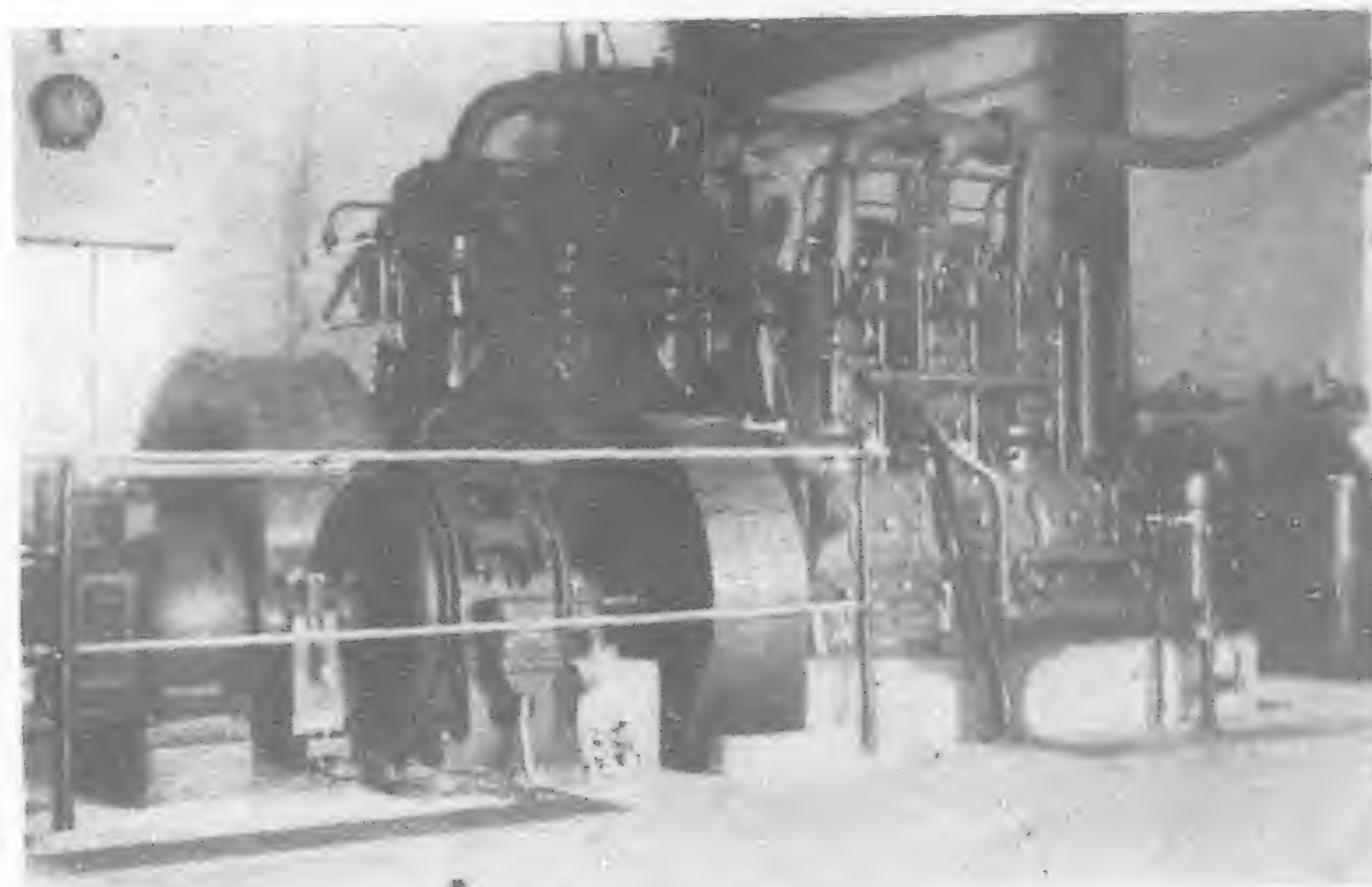


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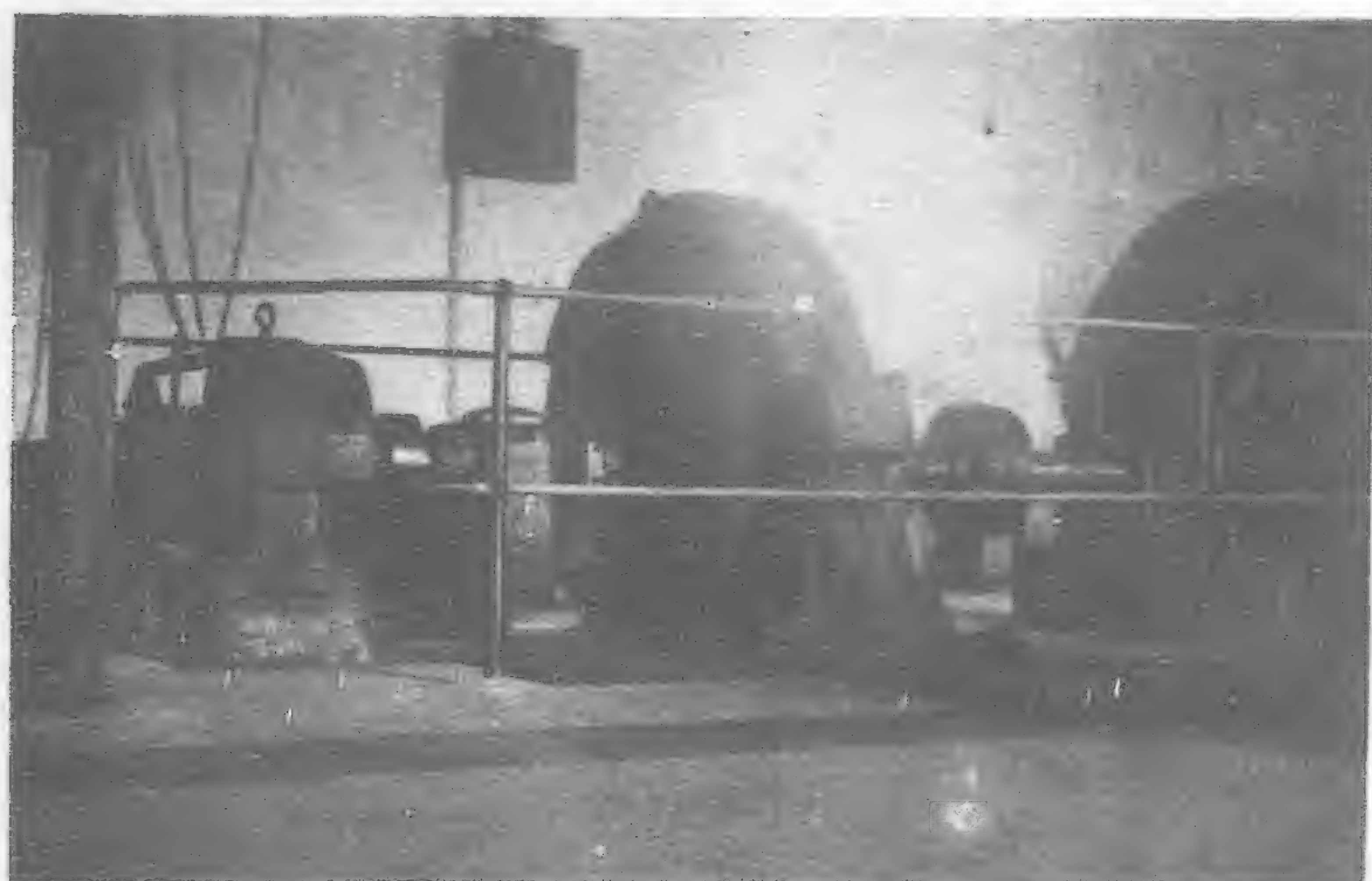


- 1.—A Ruston motor-driven air compressor for charging the starting air receivers.
- 2.—A Ruston power compressor as a standby, consisting of a two cylinder unit, one cylinder being the power unit and the other being the air compressor.
- 3.—A Rees-Roturbo direct coupled motor-driven pump to supply water to the 1,500 gallon overhead tank from the cooling pond.
- 4.—A Ruston two stage centrifugal pump belt driven by a G.E.C. motor to supply make-up water to the cooling pond from the Perak River, or to pump direct to the overhead tank in case of breakdown of the pump at the cooling pond

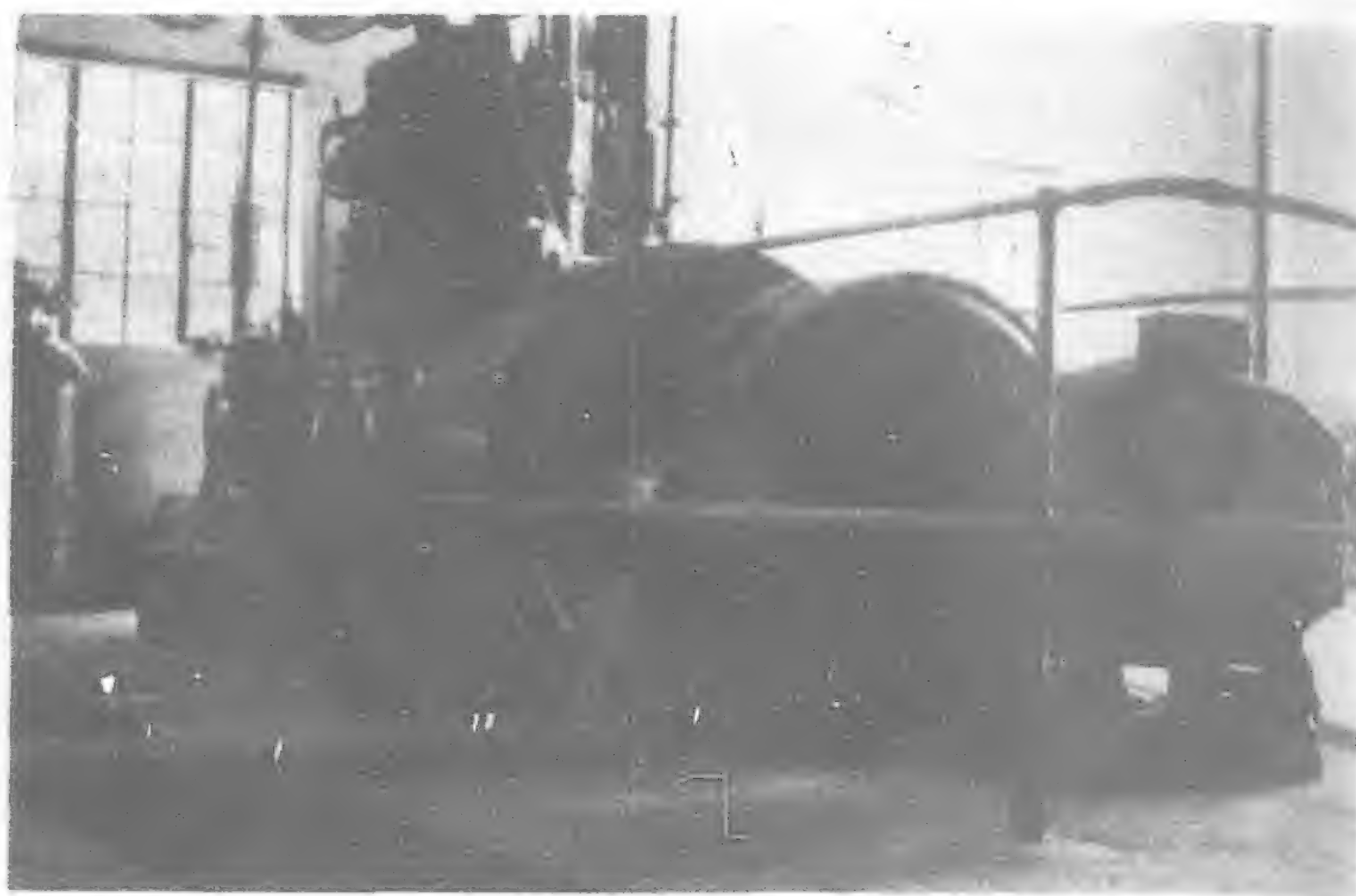
This arrangement has given very satisfactory results, no sound of the exhaust being heard at all until one is close up to the pits themselves.



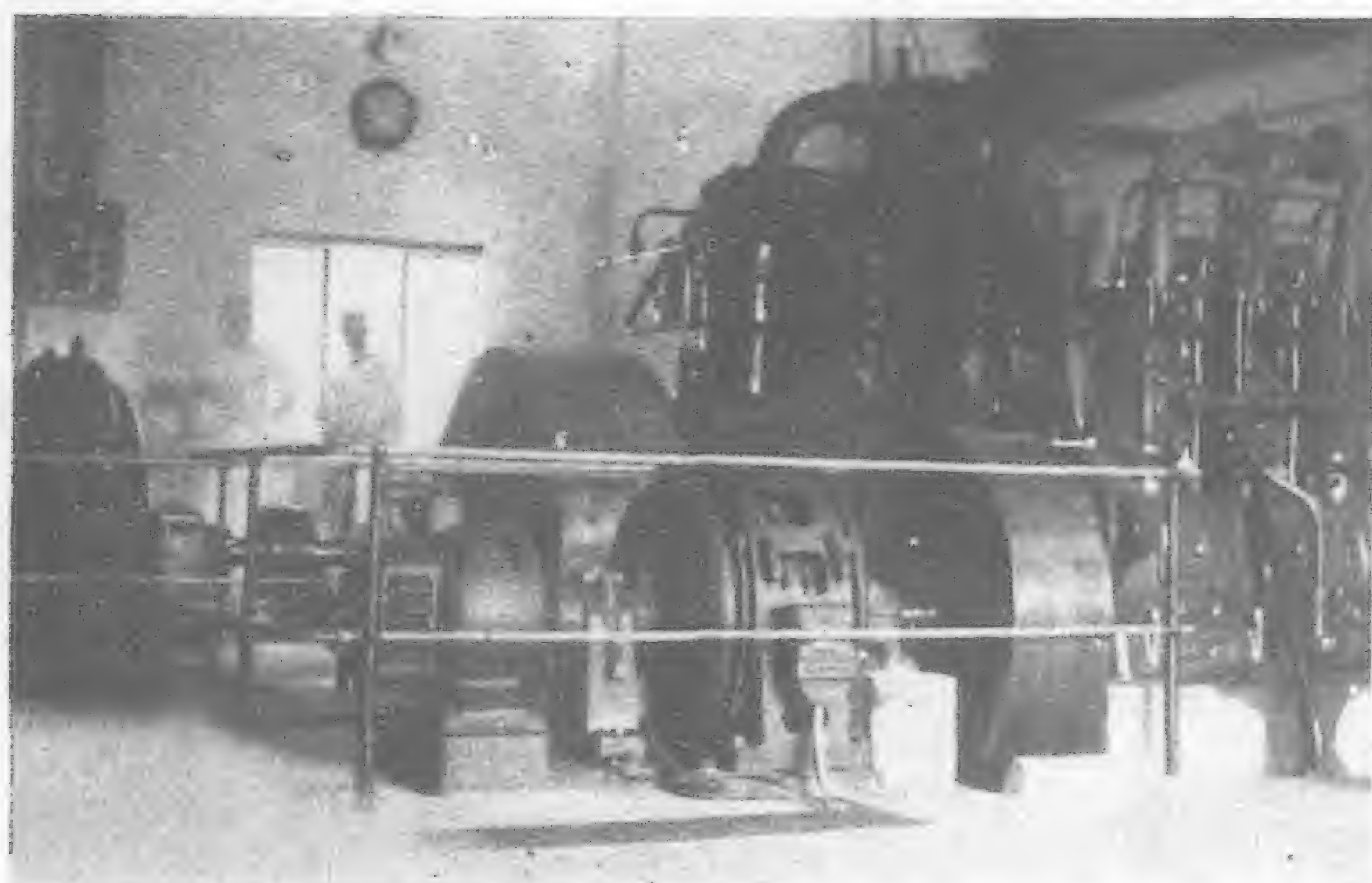
Another view of the engines



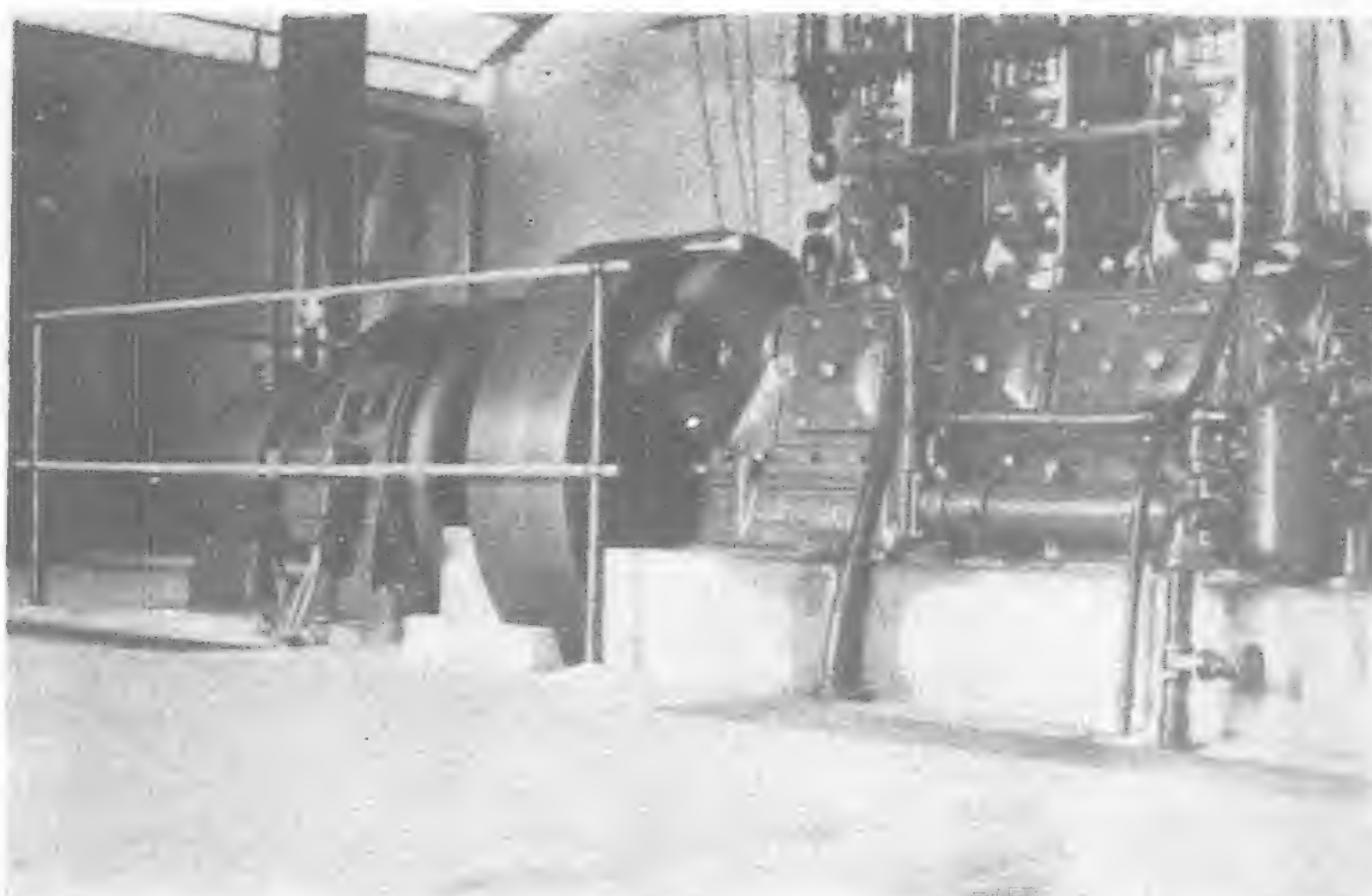
The 125 kva alternator



The 50 kva alternator



General view of generating plant



The 67 b.h.p. engine and alternator

The choice of a site for the power station presented difficulty owing to the frequent rise of the Perak River and consequent flooding.

In 1926 there was little of Kuala Kangsar town above flood level; in fact the District Officer's launch is said to have grounded on the roof of the local police station.

Again in December, 1931, serious floods occurred, which incidentally caused serious delay in the construction programme.

Eventually a suitable site was found which is about ten feet above any previous flood level. But it means a lift of some 80 feet to pump water from the river to the overhead cooling tank outside the power house.

The official opening of the power station was carried out with due ceremony by H.H. the Sultan of Perak on the evening of May 10, and the plant has continued to give a 24 hour supply from that date.

Gold Mining in Soviet Russia

(Continued from page 316)

The total gold production of Siberia in the last fifty years was 1,940,122 kilos or 60,143,782 ozs. troy, representing a value of £360,852,372.

From these statistics one can perceive that gold-mining in Siberia has always been constant and flourishing. It is also to be noticed that the gold production in Siberia in pre-war time was principally the result of private enterprise. Already in the year 1877 the gold production of the Crown amounted to 168½ pd. or 6.7 per cent, while the private production was 2,334 pd., or 93.3 per cent.

In California, Australia and New Zealand, where labor is very dear, they consider alluvials containing gold of two shillings per ton very profitable for exploitation. On the contrary in Siberia, where labor is cheap and plentiful until now such alluvials have been completely neglected because other considerably richer were available, e.g., in the year 1864 in the Valley of Uderey, in the province of Jenissey, 17,800,000 tons of alluvials were washed and from these 70,000 kg. of gold were extracted, i.e., about six grammes of gold per ton, in value 15 shillings per ton. On the same basis I have calculated that in the Jenissey district alone from the year 1834 until 1874, 130,000,000 tons of alluvials were washed and the product in gold amounted to 400,000 kg. to the value of eight shillings per ton.

From all this it is perceptible that up to the present time there has been no necessity to work upon material of a lower grade than the above, and the alluvials washed have always been of high values. From the above table it is apparent that the gold output in Siberia has always been extremely regular, and the total production from 1882 until 1900 has always maintained an average level. The particularly rapid development of the mines in the Transvaal from the year 1892 was due to an immense capital investment of about £160,000,000. If this sum had been invested in the goldfields of Siberia a considerably greater output than before would have been obtained.

The methods for gold exploitation in Siberia until now have been very primitive. This industry stands on the brink of an economic evolution. Through the application of dredgers, mining machinery, and modern methods of gold extraction, such as chlorination, cyanidiny, electricity, etc., the gold-mining industry of Siberia will reach gigantic proportions and will rival the production of many other gold-bearing countries in the past. Taking into consideration the geological formation of the goldfields in Siberia, the mineralogical structure of the alluvial strata and veins together with their size, abundance and richness, it can be assumed that there is a great future for the gold-mining industry in Soviet Russia. Moreover, the industrial progress of Siberian mining will prosper. Similarly to that of California, Australia and the Witwaterstrand of South Africa.

Communications in Chosen

THE first instance of a railway in Chosen was the Keijo-Jinsen line opened in 1900, and this was followed in 1904 by the opening of the main line between Keijo and Fusan. These were undertakings by private companies. In 1905 the Keijo-Shigishu main line and the Masan branch line, both built for army use during the Russo-Japanese War, were opened to the public, and with the former the trunk line traversing the country from north to south was made complete. In 1906 the Japanese Government took over all existing lines and placed them under the Railway Bureau of the protectorate, but on the Government-General being established in 1910 control of them once more changed hands. During all this time improvement and construction work was steadily carried on; and the year 1910 saw the completion of the Heijo-Chinnampo line; in 1911 the Yalu was spanned by an iron bridge to connect the Korean and Manchurian railways; in 1914 the Taiden-Mokpo line in the south and the Keijo-Gensan line in the center were completed; in 1914 the Gensan-Kainei line in the north measuring 383 miles was started and completed in September, 1928, at the cost of Y.90 million.

In the meantime, single control of the railways in Chosen and Manchuria being considered advisable from the commercial point of view, the Government-General in 1917 concluded a contract with the South Manchurian Railway Company and entrusted to it the entire management of the Korean State railways. This continued down to March, 1924, when the Government-General again took into its own hands the operation of the State lines in Chosen. At the end of 1929 the total investment in government railways reached over Y.300 million, covering a length of 1,700 miles in active operation, and employing 16,600 men in all, inclusive of over 7,000 Koreans. The railways in Chosen, by bridging the Yalu which forms part of the boundary and making connection thereby with the continental railways, became at once part of the international railway system, and this resulted in through traffic being established between Fusan and Mukden. The following table gives some idea of railway development in this land.



Railway Station at Keijo

<i>Fiscal Year</i>		<i>Length Miles</i>	<i>Passengers</i>	<i>Freight Tons</i>	<i>Receipts Yen</i>
1929	.. ..	1,709	23,225,000	6,062,000	41,820,000
1928	.. ..	1,583	22,284,000	5,886,000	39,373,000
1927	.. ..	1,456	20,058,000	5,569,000	36,382,000
1926	.. ..	1,341	18,457,000	5,027,000	33,810,000
1925	.. ..	1,309	18,241,000	4,297,000	30,708,000
1920	.. ..	1,157	12,421,000	3,186,000	28,816,000
1911	.. ..	674	2,024,000	888,000	4,095,000

The hotel business as an adjunct to the railway business is run chiefly for the accommodation of the foreign tourists. It was first started in 1912 at Fusan and Shingishu, the two principal terminals, by making use of the upper storeys of each station. In 1914 the Chosen Hotel was built on a grand scale in Keijo with two branches at Kongo-san for the convenience of mountain sightseers, and in 1922 a similar hotel was opened in Heijo.

Of the lines now under construction the most important is the new line between Heijo and Gensan across the middle of the country, 133 miles in length. This was started in 1926 as a ten-year enterprise, and it is hoped it will prove another important link in the chain of traffic between North China and West Japan.

Private Railways

For the encouragement of private railway enterprises in Chosen, regulations were enacted in 1912 making provision for their proper supervision and protection, and in 1914 further provision was made for granting special subsidies to important lines to meet any deficiency in profit below a certain percentage on the paid-up capital of those companies to be so favored. In 1921 new regulations providing increased State aid for private undertakings were approved by the Diet and put into force for the furtherance of their development. Thus private railways in Chosen have made considerable progress, though their business condition is not yet prosperous enough to permit of them paying dividends from their earnings without drawing on the Government, and the total length open to business in 1929 reached 500 miles operated by six companies, while new lines under construction, actual or projected, embraced some 685 miles by six companies. During the year 1929 the number

(Continued on page 329)



Chosen Hotel at Keijo

Diesel Operated Tea Factories in the Dutch East Indies

DURING the last few years various tea factories in the Dutch East Indies have extended and modernized their plants, the technical installations in many of them being supplied through Sulzer Brothers in collaboration with the Amsterdamsch Kantoor voor Indische Zaken (AKIZ), the representatives of Sulzer Brothers in the Dutch East Indies. Some of these plants are described in detail in the following pages, a short account of the usual methods of preparing the tea leaves in the plantations of Java and Sumatra being first of all given.

The tea plantations in the Dutch East Indies are situated at an altitude of 1,650-4,900 feet above sea level, beginning approximately where the rubber plantations stop and extending upwards to the boundary where the cinchona grows from whose bark quinine is prepared. It is a hilly district, consisting of fertile high-lying and extensive valleys at the foot of volcanoes, valleys that have been filled up in the course of time by fertile earth washed down from the steep mountain slopes by tropical rains.

The plantations cover a large extent of ground, being often several hundreds of acres in extent; the prevailing color is a beautiful fresh green, in the midst of which can be seen the roofs of the factories and dwelling houses. The plantations are divided up into separate gardens, in which the small tender young leaves growing at the extreme ends of the plants are plucked by natives. The tea plants are not allowed to grow too high, only to about the height of a man.

Towards evening, the tea plucked during the day is brought into the factory, where the natives wait until the quantity plucked has been checked. The tea brought in is first of all weighed on the ground-floor and then taken up in elevators to the withering rooms, where the leaves are spread out on frames in thin layers and submitted for 14 to 18 hours to a steady current of air circulated by fans. Under this treatment the tea leaves wither, the loss of moisture being about 30 to 40 % by weight. The withered leaves are then conveyed through vertical linen tubes to the rolling apparatus on the ground-floor, where they are rolled between two horizontal discs rotated in opposite directions by means of eccentrics. They are then opened in special machines and finally conveyed to the fermenting room. Here the tea is deposited in a layer about 2 to 3-ins. deep, either on the floor, which is paved with stones, or on shelves, and is then left to ferment. During fermentation the tea generates a certain heat, and the end of the process is determined by means of a thermometer.

In the lower lying plantations, where the temperature of the air is high, the fermenting process takes place quicker than at higher altitudes, the process may even begin in the rolling room, so that it is advisable to install humidifying apparatus in that room, in order to lower the temperature by increasing the relative humidity.

The action of the humidifying plant in the fermenting room is also interesting in other respects. It is necessary to keep the fermenting leaves all in exactly the same condition, since the upper layer of leaves, which is in contact with the outside air, tends to dry, and this must be prevented. The atomizing nozzles are therefore installed in such a way that they allow the relative humidity to be regulated between 90 and 95 per cent in accordance with the regulations of the tea research station at Buitenzorg, and to keep it as constant as possible. Since the fermenting leaves can

no longer become dry in the moist air, a uniform product is obtained which is highly esteemed by purchasers.

As already mentioned, humidifying the air causes the temperature to fall, which is particularly advantageous in factories situated at low altitudes. In plantations at higher altitudes, the temperature may be so low that the tea begins to ferment very late; it may even happen that it does not ferment at all. In such cases it is necessary to warm the fermenting room, but the air must then be also well humidified, since an increase of 1°C. in the temperature of the air with a constant absolute humidity causes a fall of about 3 to 4 per cent in the relative humidity. It will be found advantageous to install devices heated by steam or electricity through which the air for the room is passed and thus heated up quickly.

A special system of regulation allows the quantity of air delivered by the fan to the heating elements to be adjusted in such a way that the air in the room is at the same time constantly renewed. By adopting this combined system of heating and humidifying, excellent results have been obtained in plantations at higher altitudes where the fermenting process was formerly found to be difficult to carry out. With the Sulzer plant, it has always been found possible to keep and to regulate the temperature and relative humidity within the limits prescribed by the tea research station at Buitenzorg. At the same time, the important question of constantly renewing the air in a room in which the air is naturally rendered impure by the fermenting process, may be regarded as solved.

After fermenting, the tea is brought into the drying room where the rest of the moisture in it, to within a small percentage, is removed. As a rule the drying

room is located in the center of the factory and on the ground-floor, where the drying must be effected as quickly as possible and also at the lowest possible temperature, i.e. under exactly the opposite conditions as before. From the drying room the tea is taken to the sorting room, where it is cut and sorted, after which it passes to the packing room. There it is filled carefully into lead or aluminium air-tight packages, which are then placed in special wooden boxes, each containing about 100 lb.

In former times the tea was sorted by natives, who carried out the work very skilfully by shaking it on sieves made of bamboo or other cane. This system of sorting, however, had the drawback of creating much dust, which had to be removed by special fans. A further drawback of this method of working was that a comparatively large number of natives was required to carry it out and they could be much better employed in the gardens. In addition to that, this method of working took too much time and the tea changed color in an undesirable manner, becoming grey instead of remaining black.

The tea research station at Buitenzorg has repeatedly recommended planters and tea merchants to improve the methods of sorting, and factories with modern equipment are now provided with mechanical and pneumatic sorting apparatus. There is, for example, the factory at Gedeh, in which two Sulzer sorting apparatus are installed, working with a horizontal current of air moving at a speed of 15 to 25-ft. per second. The tea, which falls down a distance of about 13-ft., is caught by the air current and carried away, the individual particles separating out at a greater



Fig. 2.—Factory of the Broedjoel Tea Plantation, Java. To the left, the Diesel power station, with two Sulzer Diesel engines.

or less distance from where they are fed in, according to their weight and the resistance they offer to the air; in this manner a preliminary sorting is effected. Any dust is carried off by the air current and collected in a special chamber. The subsequent work of sorting the tea by hand is much simplified by this method, and can be carried out much quicker and by fewer people. The tea is also not so grey as when sorted by the old method. In the new factory at Gedeh the tea is conveyed from the drying room to the sorting machine by a pneumatic method introduced by Sulzer Brothers. This has the advantage of conveying it more quickly and effecting a great saving in labor: it also helps to prevent the tea becoming grey.

When building the Broedjoel tea factory one circumstance was particularly favorable, i.e. that the owners had at their disposition in the person of Mr. Hoekstra a particularly skilful engineer who was able to prepare an excellent scheme, differing in many respects from the rather conservative methods hitherto employed in Java. Figure 2 shows the Broedjoel factory, with the electric power station to the left and the factory buildings to the right. In contrast to the layouts hitherto usual in Java, where the power station is generally located in the center of the factory and drives the machines through shafting, the power station and factory are here separate, and all machines are provided with individual electric drive.

This arrangement allows the electric power station to be removed far enough from the tea factory to ensure that the air in the latter is not contaminated by the exhaust from the Diesel engines, and also that the Diesel engines and the electric generators are in a position where they cannot be affected by the fine tea dust.

The electric supply is three-phase 50 periods at 380-volts, i.e. 220-volts between conductors and the neutral, which is earthed, so that two voltages are available, viz. 380-volts for the motors and 220-volts for lighting. At first the voltage between the cables was 220, as is usual in various factories in Java. 380-volts is the highest "low voltage" allowed by the government.

Calculations have shown that in a tea factory, working like the Broedjoel factory with a large number of motors, a great saving in cable and distributing material is made by adopting a voltage of 380-volts. The AKIZ has already adopted this voltage with

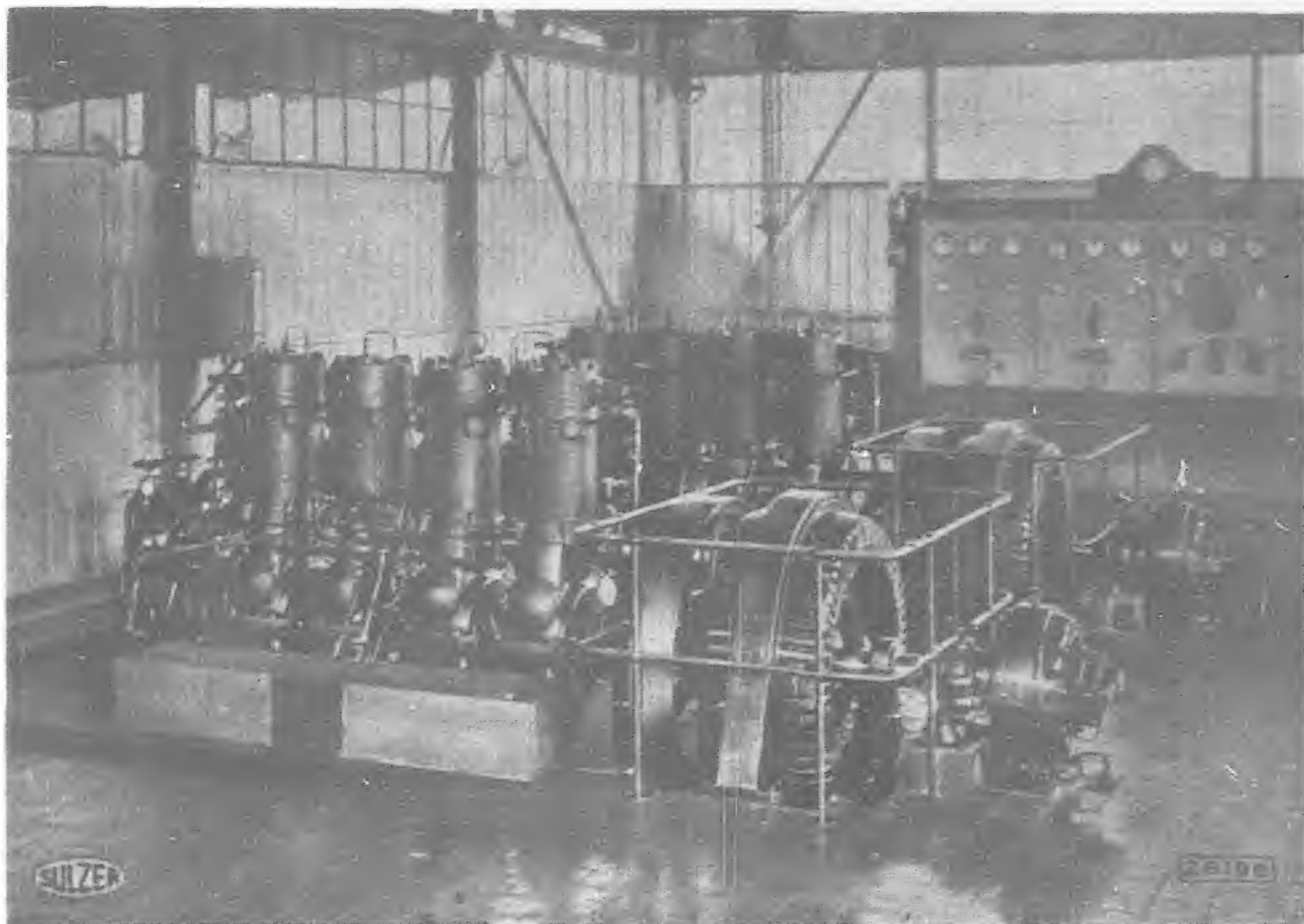


Fig. 3.—Diesel power station of the Sambawa Tea Plantation, Java. Two airless-injection Sulzer Diesel engines, developing together 240 b.h.p. at 300 revs. per min.

great success in other tea factories, and also in sugar factories and mines, and this greatly helped to introduce it in Broedjoel.

Fig. 3 shows the power station at Sambawa, which is equipped with two Diesel electric sets. Each set consists of a 120-h.p. Sulzer two-cycle Diesel engine with direct injection of fuel, running at 300 revs. per min. The engines are direct coupled to A.E.G. three-phase generators, 400-volts, 50-periods.

The sets are put in parallel by changing the speed by means of a device fitted on the governor of the Sulzer engines. The governor is very accurate and allows the speed to be kept practically constant at all loads. The engines run so smoothly and regularly that the pointer of the revolution indicator remains practically immovable at the red mark at 300 revs. per min. while an engine is running. The only matter for the Tirrill regulator to attend to, is to regulate the fall in voltage caused by fluctuations in the load on the generators; it is owing to the great accuracy of governing of the engines and also to the Tirrill regulator, that the electric plant at Broedjoel works with absolutely regular periodicity and

voltage such as is seldom found in the electric mains of an electricity supply company. This is of particular importance in the case of a tea factory, since the speed of the tea-handling machinery must not be subject to fluctuation.

It is specially important to keep the speed of the tea rollers constant, in order to ensure a uniform product being obtained; also for sorting the tea leaves in the large hall, the electric light must burn without any fluctuation. These factors alone justify the necessity of having extremely regular working of the electric equipment. Automatic regulation of speed and voltage has also the advantage of making continuous attendance unnecessary.

The buildings of the power station are erected in steel and are well ventilated. The floor is covered with plates which are easily kept clean and do not absorb any dust.

The motors used for driving the various machines and apparatus are all A.E.G. three-phase motors with double squirrel-cage rotors. In these motors only the stator, but not the rotor has an insulated winding; this increases reliability in the tropics. The motors have neither rings nor brushes. The stationary winding is specially impregnated for the tropics. Starting is extremely simple and can be effected by a simple single apparatus, a star delta switch,

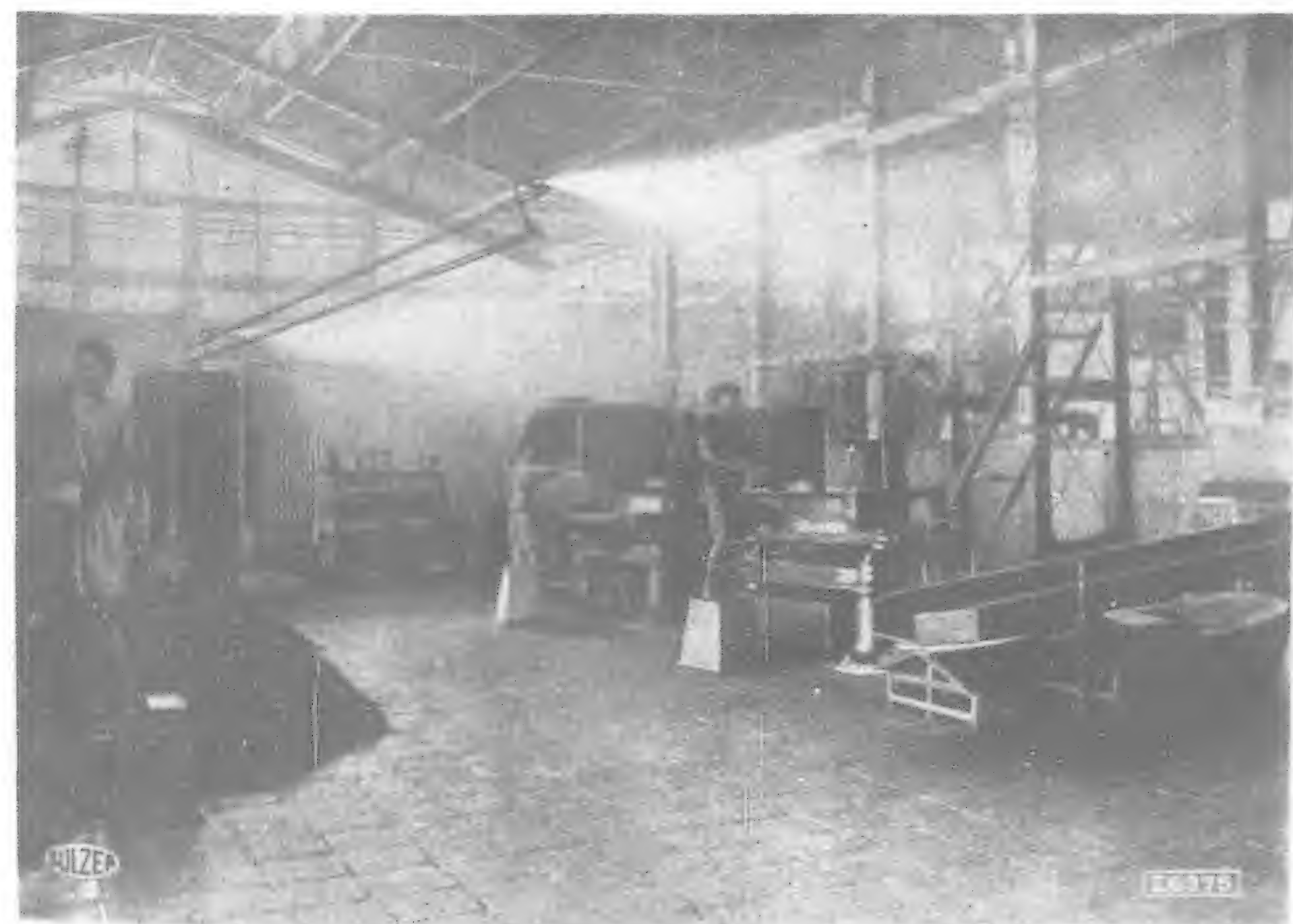


Fig. 4.—Tea rolling machines and roll breaker with Sulzer air humidifying plant, Tjisampora Tea Plantation, Java

The majority of the machines used for preparing the tea leaves work at a low speed. To obtain a higher efficiency and at the same time a higher load factor, it is advisable to employ a high-speed motor, for example with a speed of 1,400 revs. per min. In order to be able to comply with these conflicting conditions, the motors are coupled to a spur-wheel reduction gear running in an oil bath. The efficiency of the gear is estimated at about 97 per cent, about the same as for belt drive. In addition to that, the gear works with very little noise. The small high-speed motor is mounted with its casing direct on the casing of the reduction gear. The free end of the low-speed shaft is direct coupled to the machine working the tea leaves.

Interesting groups of machines in the factory are the electric fans, which are used particularly in the withering rooms. The Sulzer propeller fans which have been installed run at 350 revs. per min. Fig. 5 shows fans in the withering rooms, which take up half the length of the first floor of the factory. All the fans together can deliver 89,000 cub. ft. of air per min. at normal temperature, the static suction pressure for that output being 0.15 in. There are six groups of fans for the withering rooms on the first floor and two groups for exhausting the dust from the sorting hall on the ground-floor. The electric motors in the withering rooms are of the open type, whilst those in the sorting room and in the packing room are totally enclosed, to protect them from dust.

At first it was proposed to drive the machines in groups. For example, two rolling machines could have been driven by means of one electric motor of double the power of the ones now used. This solution was, however, abandoned, since the two machines would then have had to be connected to each other by a common shaft, and this would have obstructed the passage between them.

In the sorting room an air duct is arranged above the tea sorting apparatus; it serves for removing the dust collecting over the machines. The air is withdrawn by means of a Sulzer low-pressure fan.

The visitors present when the factory was first put into service, had an opportunity of appreciating the simplicity of the power station and of the electrical and mechanical plant, as well as the machines preparing the tea leaves; it was also noted by them how little power was required to drive all the machines, and how scrupulously clean everything could be kept because of the excellent ventilating system. Newspapers in the Dutch East Indies have published full details of the equipment and describe the Broedjoel tea factory as a model plant.

In the journal *De Thee*, Dr. Karl Bernard, a prominent scientist and director of the Buitenzorg tea research station, writes as follows concerning the new Pangledjar factory:—

"... The excellent quality possessed by the tea shortly after the factory was started is partly, if not principally, to be attributed to the well-designed plant in the fermenting room."

Interesting also are the remarks made by another expert of the Buitenzorg tea research station, Dr. J. J. B. Deuss, who after visiting the Sulzer Brothers heating and humidifying plant in the Patoeahwattee factory expressed himself as follows:—

"The plant (Sulzer) has the great advantage that everything can easily be regulated, so that service is continuous and the product remains uniform. I have, seldom, with such an arrangement, seen tea worked up so well. Now it is possible to produce the same quality of tea in the morning as in the course of the day. The air in the fermenting room remains fresh; it is renewed regularly and the plant complies with all requirements. Although this plant is the first of its kind, it worked satisfactorily in every respect from the start and proved that it is necessary to heat and humidify the air in a cold fermenting room."

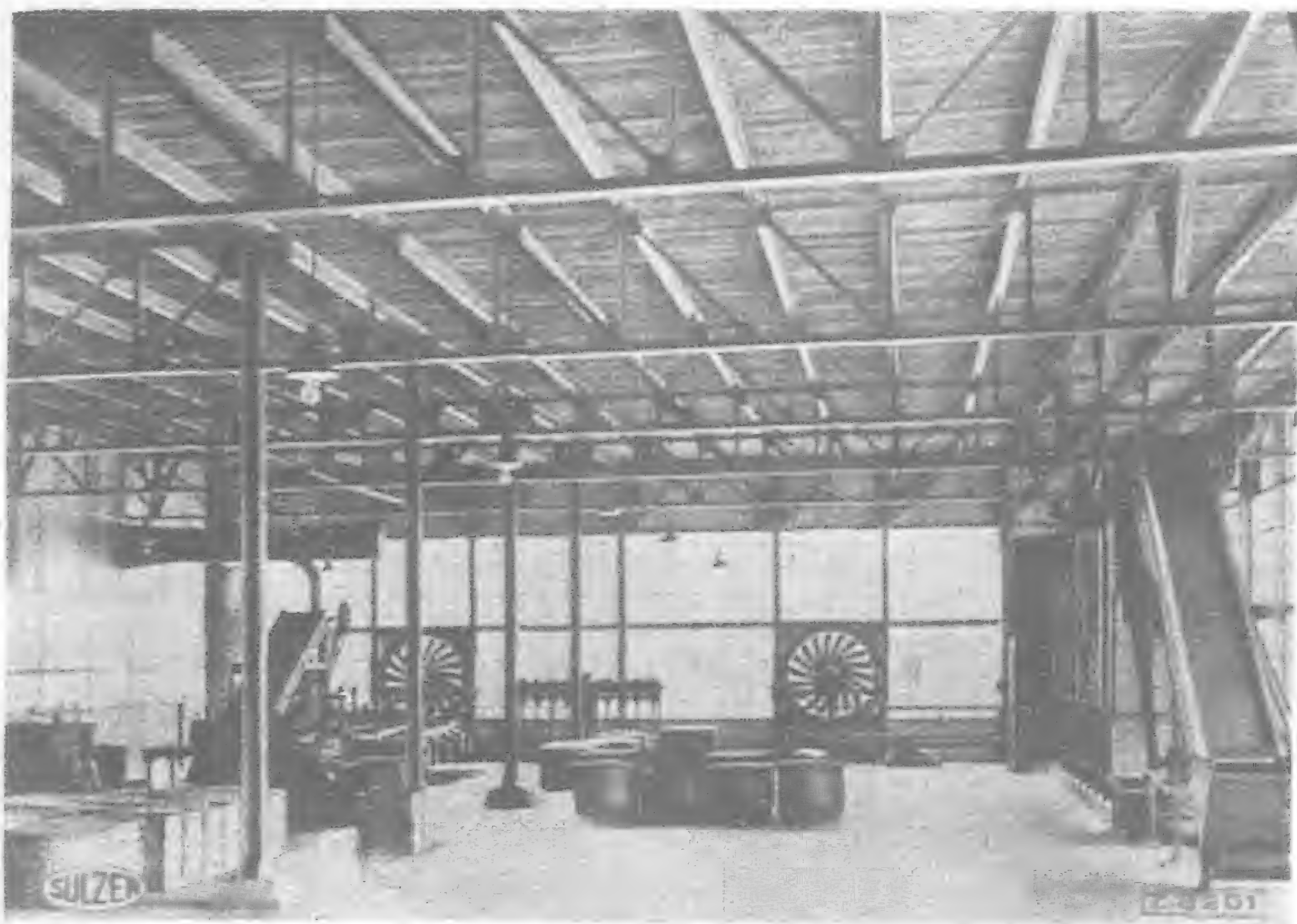


Fig. 5.—Tea sorting room of a Tea Planation in Java, with pneumatic tea sorting plant and Sulzer propeller fans for removing dust. Working conditions for each fan:—About 31,800 cub ft. of air per min. at 0.15 in. W.G.; speed 370 revs. per min.

The Sulzer air humidifying system offers the special advantage that no water can drip from the nozzles either when the apparatus is in service or not. When delivery of compressed air is shut off, the delivery of water to the nozzles is also instantly stopped, i.e. before the pressure in the air line has had time to fall to atmospheric. In this way the water is atomized to the last drop and none remains in the nozzles. This is of special importance, since it ensures that the tea will not be damaged.

The Tjisampora factory was the first to install Sulzer atomizers in the rolling and fermenting rooms. The Soemadra factory uses humidifiers over a roll breaker next to the fermenting chamber, and also in the fermenting chamber itself. The Gedeh plantation has six atomisers in service in the fermenting chamber and the same number in the rolling room. All these apparatus are regulated by means of a single device, in accordance with the relative humidity in the room. In the Tjiomas factory there are eight nozzles in the fermenting room and four over the roll breakers in the rolling room. In this factory a regulating device is provided for each room, so that the humidity in one room can be regulated independently from that in another.

In the Patoeahwattee, Pasir Junghuhn and Sedep factories, all of which are at a high altitude, where the outside temperature may fall several degrees below freezing during the night, combined heating and humidifying plants are provided for the fermenting rooms. In the Patoeahwattee factory a small Sulzer steam boiler, for raising low-pressure steam at about 15 lb. per sq. in. for heating purposes, is installed beside the fermenting room. In the Sedep factory, a boiler raising steam at 40 lb. per sq. in. was already existing, the steam from which was available for heating purposes. In the new factory at Pasir Junghuhn, which belongs to the Dutch East Indian Government and is equipped on up-to-date lines, electric current was available for heating, and the Sulzer system could easily be adapted to this.

The Sulzer system of humidifying can be adopted, with or without heating, in all cases occurring in practice, no alterations in the buildings being required. It can be installed in existing buildings or in new ones without any difficulty.

Power Stations in Japan

The Kinu-gawa Hydro-Electric Co. has applied for permission to extend its Sumida power station from 21,000 to 36,000 kw. The construction of three substations, each of 100,000 kva. capacity, at Iwakura, Sakura, and Kizu, is proposed by the Toho Power Co. Official permission has now been received for the proposed 30,000-kw. extension of the Yamaguchi Prefectural Ube No. 2 thermal power station. Development schemes under the consideration of the Tokyo Electric Light Co., include the extension of some of its power stations by 20,000 kw. and the erection of additional hydro-electric and thermal stations.

Toho Electric Power Co. has completed plans for the construction of the Sunmatakwa power station with 65,000 kw. of plant, and the Yasaka Hydro-Power Co. a subsidiary of the Daido Power Co., is also planning to build the Taihu power plant having a capacity of 60,000 kw. The Nippon Electric Power Co., has completed its plans for the construction of the 72,000 kw. Kanetsuri power plant on the Kurobe River, while the Mitsubishi interests are reported to be working on plans for the construction of a power plant in Chosen which, when completed, will have a capacity of 200,000 kw. The Seitetsusho (Government Steel Works) is also contemplating the further extension of its thermal power plant.—*Eastern Engineering and Commerce.*

Mercury-Arc Rectifier Plant is Installed in Japanese Substation

THE Sangu Kyuku Electric Railway Co., ordered a mercury-arc power rectifier plant for the provision of current for their railway system, which was put into service towards the end of 1930.

Nunobiki substation consists of three 2,000 kw, 1,500-v Brown Boveri mercury-arc power rectifier sets. Apart from the normal rating mentioned, the rectifiers can withstand an overload of 50 per cent for two hours, 100 per cent for one minute and 200 per cent momentarily. Each set consists of a transformer, a 12 anode rectifier with accessories, the a.-c. high tension and D.C. apparatus.

On the high tension side the plant is connected to a 33,000-v a.-c. system with a frequency of 60 cycles.

The substation was constructed under very difficult conditions in a rugged mountain district. It was possible to carry the a.-c. incoming line across it only by the use of exceptionally heavy pylons with long spans. Moreover, the transport of the material required to construct the substation proved to be exceptionally difficult. The substation building adjoining outdoor high tension plant were erected on a projecting ledge of rock commanding a precipice.

The outdoor plant comprises not only the high tension apparatus consisting of circuit breakers, current transformers, voltage transformers, etc.,



Fig. 1.—Sangu Kyuku Electric Railway. General view of Nunobiki substation (Outdoor switch gear and transformers for three-phase current 33,000-v. 60 cycles)

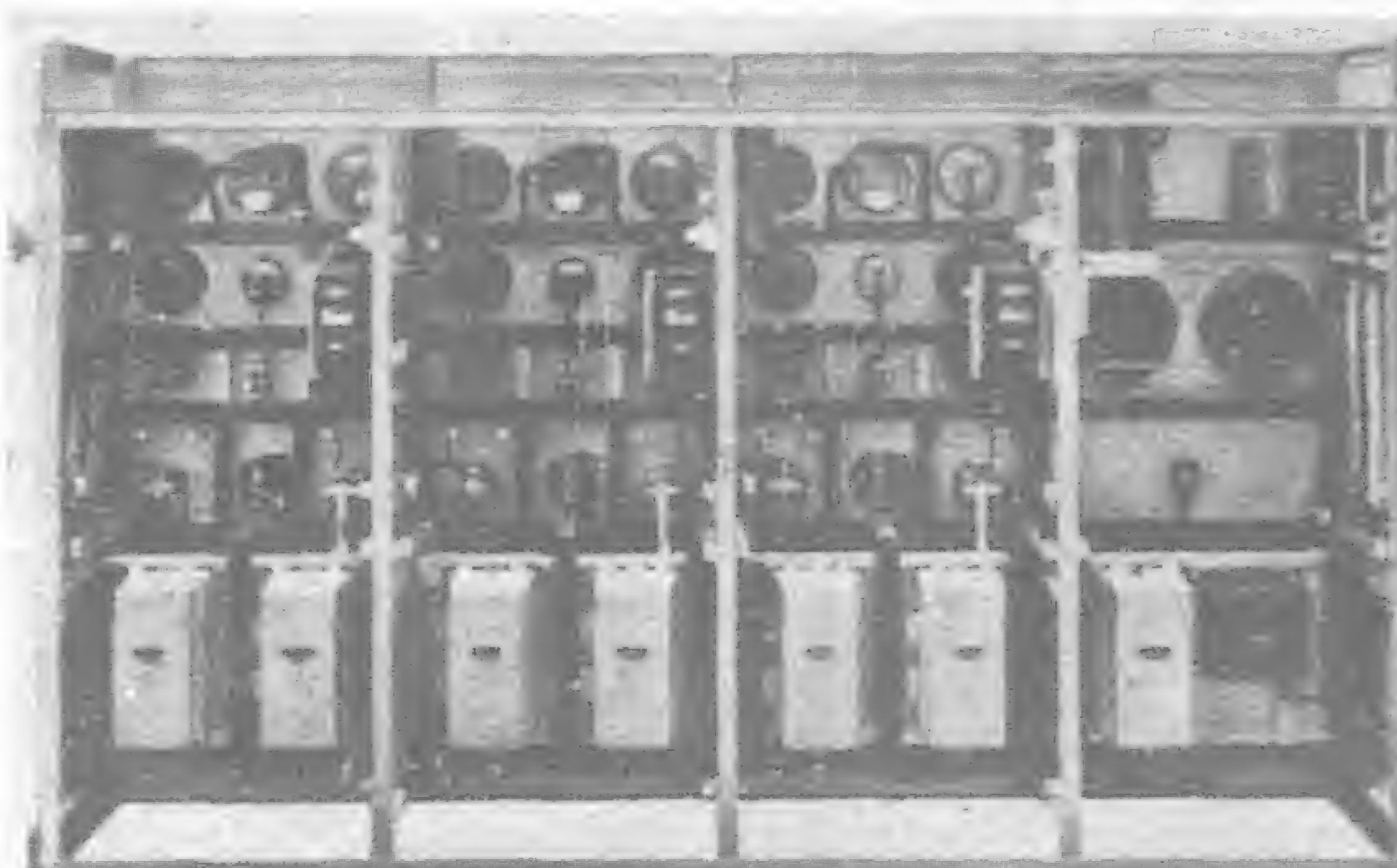


Fig. 4.—Back view of the switch panel showing the apparatus for automatic operation

but also the rectifier transformers. On the secondary side, the latter are directly connected to the corresponding rectifiers. The rectifiers, D.C. apparatus, switch-board and auxiliary services were installed in the building. A further building contains a space which can be utilized for dismantling the transformers and rectifiers.

Each set of oil circuit breakers consists of three single-pole breakers having an interrupting capacity of 500,000 kva. They are intended for operation at 33,000-v and have a rated current of 400A. The three switch poles were connected together and are operated by a common motor at 220-v.

Two of the poles have over-current relays connected to separate coil current transformers; a further current transformer supplies a thermal relay which protects the rectifier set concerned from the occurrence of inadmissibly high overloads by switching-in a reserve set. The thermal relay consists of two thermo-elements immersed in oil, and its characteristic corresponding to the heating characteristics of the transformer concerned. These relays thus guarantee protection for the rectifier set in the manner most suitable for the conditions of service.

The primary winding of the rectifier transformers is star-connected, the secondary being in double fork connection. The neutral points on the secondary side of these transformers were brought out over the cover and form the negative poles of the D.C. system.

The individual phases of the six-phase system are directly connected to the corresponding anodes, horn-gap arrestors being connected in parallel to these. The latter form a remarkably efficient protection against the occurrence of over-voltages.

As already mentioned, the rectifiers have 12 anodes and are arranged for six-phase operation. They were erected in the machine room on a low concrete base. As usual, each rectifier has its own air pump set consisting of a preliminary and a high vacuum pump. The rectifier, the vacuum pipes and the high vacuum pump are cooled by continuous water supply. The circulating water pipe is automatically opened or closed as required, by an electrically controlled water stop valve. The cooling water piping to the high vacuum pump is directly connected to the circulating water pipe. The flow of cooling water is correctly controlled by means of a water flow alarm. The cooling effect can be determined by measuring the temperature of the anode plates, so that it is unnecessary to supervise the temperature of the cooling water. The thermometers on the anode plate are fitted with platinum interlocking contacts.

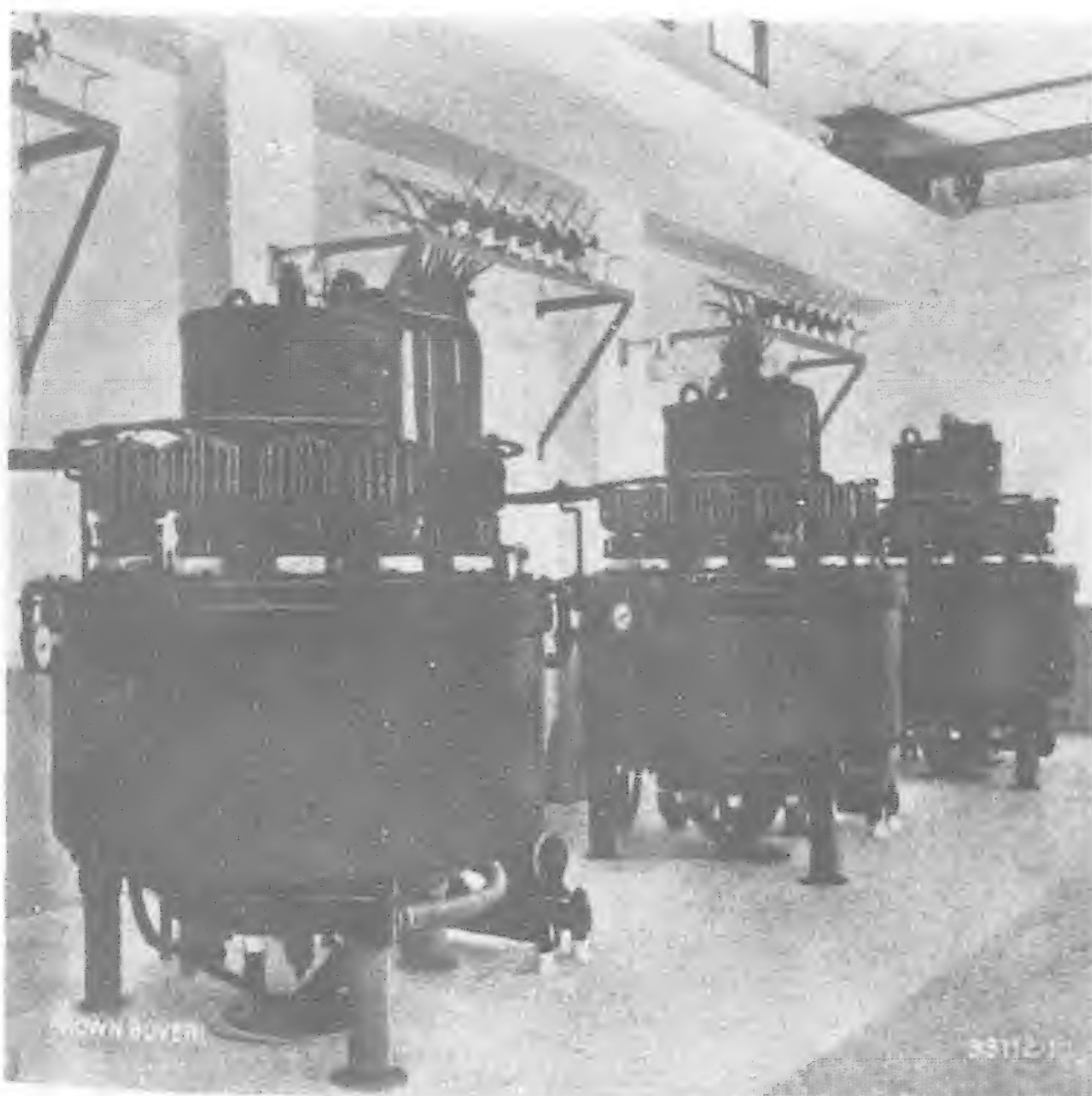


Fig. 2.—Inside view of Nunobiki substation. Three Brown Boveri Mercury-Arc power rectifiers type A.712, each 2,000 kw. 1,300-v.

The closing of these contacts by the mercury column of the thermometer puts the corresponding rectifier set out of operation. The temperature of the anode plates at any time can be read off on large-scale thermometers.

On the D.C. side, the rectifiers are protected by Brown Boveri D.C. single-pole quick-acting circuit breakers. Moreover, the same type of circuit breaker was adopted for the four outgoing feeders. All these circuit breakers are operated by remote-controlled motors, which are also supplied at 220-v. The cathode D.C. quick-acting circuit breakers are fitted with reverse current relays instantaneous in action, and the D.C. feeder breakers with adjustable over-current relays.

The operation of the whole substation is entirely automatic, one or more rectifier sets being put into or out of service by means of a time-switch or by voltage or current relays. In addition to the main apparatus for automatic operation, each set is fitted with an automatic starting and reclosing device. The latter consists of a special type of switch gear provided with a single-phase driving motor with oscillating rotor and a number of relays and contact making devices. The switch gear units are all connected to 60-v a.c. and, during a very short time, consume remarkably small quantities of current. Thus, for example the power absorbed by a motor with oscillating rotor is only about 10 va.

On the command of a central apparatus, the starting and reclosing device closes and trips the high tension switch, and also after completed ignition and excitation of the rectifier, closes or opens the corresponding D.C. cathode circuit breaker. Moreover, the starting and reclosing device closes the switch three times after interruption because of an overload or a short circuit, or after the interlocking of the set in case of a disturbance, of an excessively high temperature at the anode plates, of shortage of cooling water, or of a poor vacuum inside the rectifier tank. After completed interlocking of a set, the same device transmits to a reserve set the commands originally received from the central apparatus.

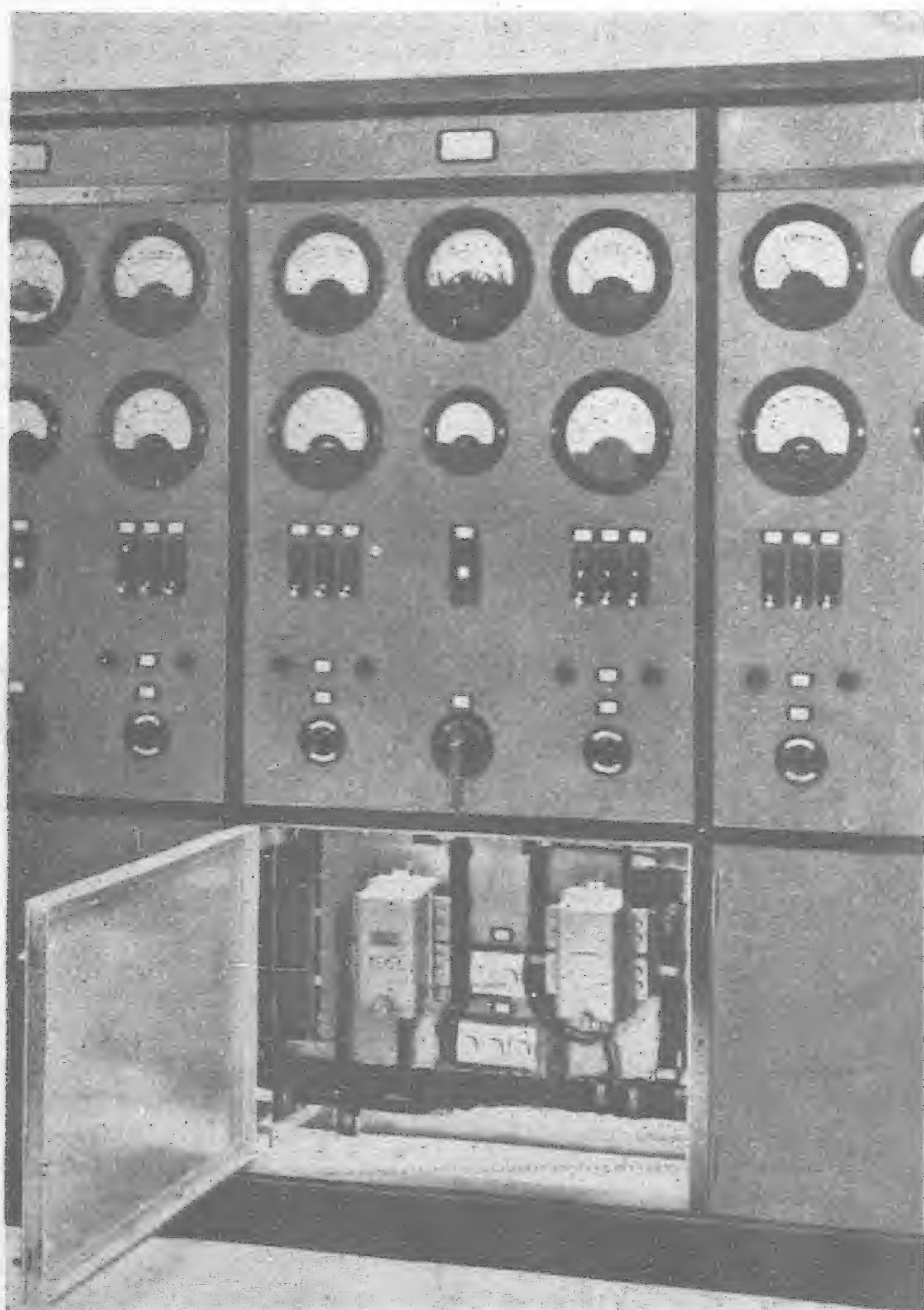


Fig. 5.—Detailed view of the Rectifier Switch Panel showing sectional panel with opened door

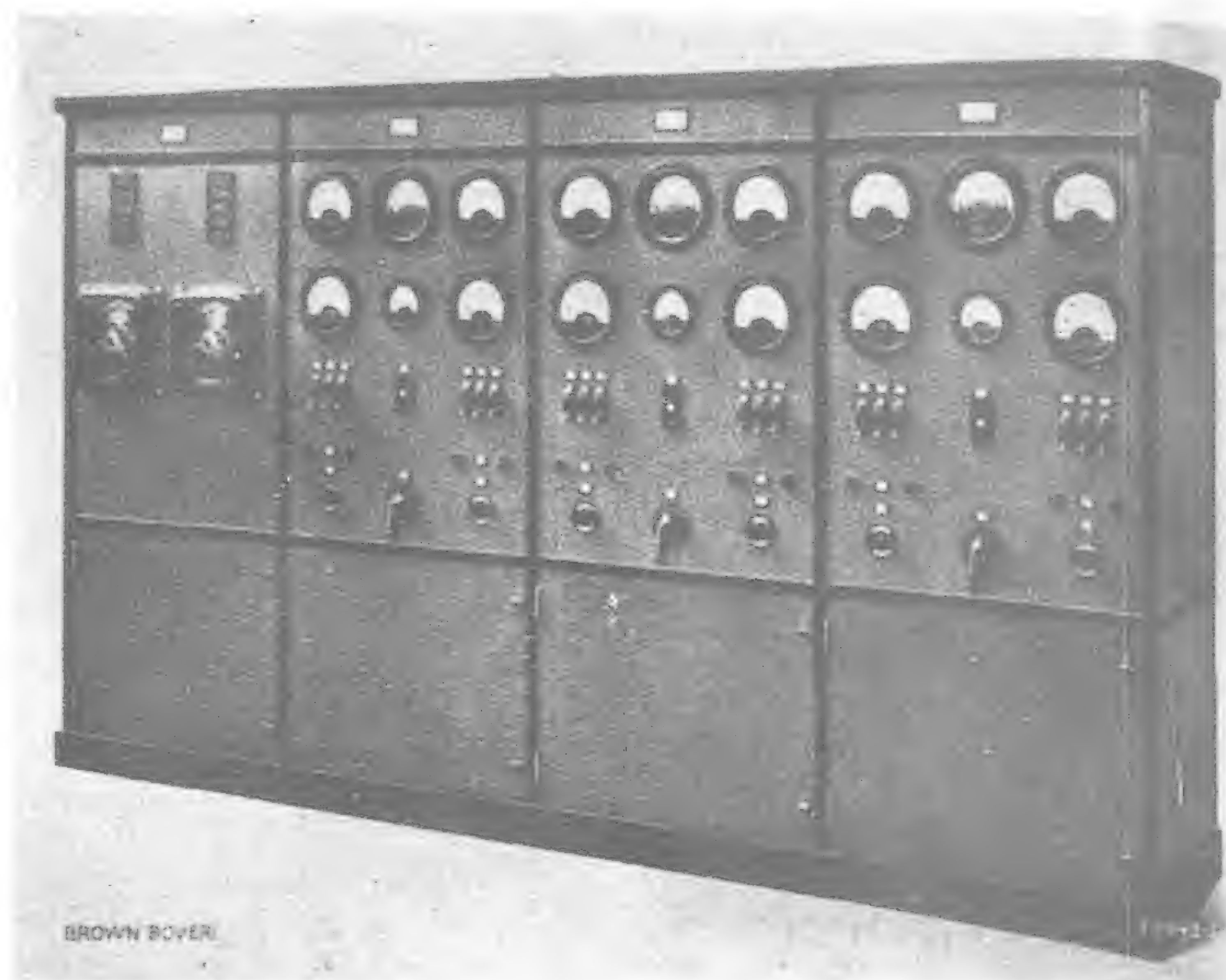


Fig. 3.—Front view of Main and Sectional switchboards.

The apparatus for automatic operation was installed in a number of panels which together form the switch-board of the plant. Fig. 3 shows the front view of the central panel and the three sectional panels. The contact makers of the section panels operate the high tension or D.C. switch, while, by means of the small hand switches, the required conditions of automatic operation are chosen, corresponding to:—

Continuous service ;	Control by voltage and current
Control by thermal relays ;	relays ;
Control by time switch ;	Reserve.

A set which is again ready for service can be released by means of the push-button. One of the rotary switches is utilized for operating the vacuum pump by hand, the other for disconnecting the apparatus for automatic operation from the auxiliary source of current. The four signal lamps, two red and two green, indicate the position of the high tension switch and that of the D.C. circuit breaker at any time. The measuring instruments provided are an a.c. ammeter, a D.C. voltmeter, a vacuum indicator with a control contact device and an excitation current ammeter. In addition to these instruments, recording D.C. ammeters and voltmeters are provided for the whole plant. The recording instruments were installed in a separate panel. Kilowatt-hour meters for the a.c. and D.C. sides were also provided.

On the front of the main panel there are control, voltage and current relays, which are intended to put the plant in and out of service according to the contact wire voltage and current.

In order to facilitate easy supervision of all parts of the switch panels, their outer casing can be partly opened (Fig. 5).

Nunobiki substation of the Sangu Kyuku Electric Railway Co., is situated in an exceptionally wet mountainous district far from inhabited parts. This fact, and the severe conditions under which this substation operates, indicate once again that Brown Boveri mercury-arc power rectifiers are suitable for all types of service and prove completely satisfactory in continuous operation.

Trams for Nanking

Plans for the construction of a network of trolley car lines for the main thoroughfares of Nanking are under consideration by the National Reconstruction Commission. It is learnt that preparations are far advanced and the project practically decided upon.

Rapid transportation in the Capital at present depends chiefly on rickshas and motor-cars both of which are beyond the means of the masses. There is at present an omnibus service in the city but this is operated inefficiently. A system of rail-less trams will be established by the Government to meet the growing requirements of the population and it is understood that the contract will be awarded to a German engineering company.—Kuo Min.

Macao's Water Supply

ALTHOUGH the Portuguese Government has often gone into the question of providing adequate water supplies for Macao, and several Portuguese engineers attached to the Government service, either working alone or serving on commissions, have, during the last half century, drawn up schemes to provide the city of Macao with a modern service, it has not been until recent months that anything like a practical scheme has been formulated. A complete scheme is to be submitted to the authorities and it is believed that a project to establish a modern water supply system for Macao will be put into execution before long.

The water service as is now proposed will not be a Government undertaking but will be built and maintained as a commercial enterprise by a company known as the Macao Waterworks Company. This company was established at Macao some two years ago, with a concession from the Macao Municipal Council to develop and sell water in the Portuguese colony for a period of fifty years, taking over from the Government all the extensive system of piping and reservoirs built by the authorities during the past twenty years or more.

Artesian Supplies

When the company was formed it was generally believed that there might be artesian water within the peninsula of Macao, and for a long time efforts were made to trace such supplies. The artesian source as a means of securing water for the city was abandoned only after a large sum of money had been spent by the Company to find water in this way at Macao.

As a last resort, the Macao Waterworks Company engaged the services of the well known engineering firm of Siemens to try to solve the problem of providing Macao with a modern waterworks system. The engineers are now preparing the final lay-out plans for the works of a scheme which it is believed will fulfil all the conditions that may be required to enable the little Portuguese colony to possess a complete modern water service.

An interesting feature of the scheme as prepared by the engineers is that this service will be dufold one supply being maintained to furnish potable water and a distinct supply and service to distribute water that is destined for other purposes.

Mr. H. Woltmade of the Siemens Company is the engineer responsible for the designing of the new scheme and in his studies he was fortunate to have the ready collaboration of Col. Schiappa Monteiro, Director of the Public Works Department, who has furnished all the data required for the working out of the details, making it possible to prepare a complete scheme that will enable Macao to be self-supporting in its supplies of water.

The scheme provides for the securing of potable water supplies in a big catchment area in the Portuguese island of Colowan to be impounded in a reservoir on the same island. After filtration and sterilization the water will be pumped into Macao through a submarine pipe line of copper-steel. The line will be several miles in length, and excepting for that part of the pipe which will lie across Taipa Island, midway between Colowan and Macao, the pipe will be all under water. It is believed that it will be one of the longest of such pipes in the world, and though the work of laying it will not present many difficult problems it will certainly be an interesting operation.

A Submarine Pipe Line

By comparison with the pipe line carrying the water from Shingmoon Valley to Hongkong, the submarine pipe at Macao will be as important an undertaking. The pipe between Kowloon Point and Hongkong is one mile in length, whereas that in the Portuguese colony will be over three miles under water. The special difficulty to be overcome in Macao is that there are three channels and many banks of soft silt, and in designing the manner in which the pipe line is to be laid special consideration must be given to these factors.

The potable water pumped into the city will then enter the distribution system of pipes at Macao, and will be served into the homes where it will be drawn off by taps in each house. This water will be used for potable purposes only, and it is estimated that the needs of the colony in this respect will be as much as 500,000 gallons per day during the first five years. The reservoir which is planned at Colowan will have a capacity of approximately 150,000,000 gallons, and is considered to be big enough to furnish the quantity of water needed by the city, while the catchment areas contiguous to that leading to the projected reservoir are also capable of considerable development, and will be tapped in later years when the needs of the city demand greater supplies of drinking water.

Water for Sanitation

For the city's other requirements an unlimited supply of water will be drawn in from the river close to Green Island at Macao. This water, which is muddy and brackish, will be made absolutely limpid and pure. It will be pumped into settling tanks, where the addition of coagulants will precipitate most of the matter in suspension in the water, the remaining solid matter being drawn off as the water passes through rapid filters. After this the water will be sterilized and, if possible, softened as well, so that although this water will not be supplied for drinking purposes no harm will come from drinking it, and at certain seasons of the year, when the freshets flow into the river from the hills of Chung Shan and the neighboring districts, the percentage of salt in the water will be so low as to be hardly perceptible.

High pressure pumps will force the water into the extensive distribution system which will be quite distinct from that laid down for potable water. The water of this second system will be used in the homes for bathing, washing of clothes, flushing, etc. and also for the watering of streets and for extinguishing fires, etc.

The installation of a system of non-potable water is absolutely essential, especially due to the high cost of delivering potable supplies of water from a distance of almost five miles. The limited quantity of water which can be secured at Colowan is another factor mitigating the use of such precious water for any but drinking purposes. The city's needs of non-potable water will exceed 1,000,000 gallons a day during the first five years after the installation of the system, and provision can be made for an immediate increase in the quantity demanded by the city at very short notice.

An Adequate Supply

Macao will therefore be supplied with not less than 500,000 gallons of potable water and 1,000,000 gallons of non-potable water as soon as the scheme is in operation, and the city will thus be certain to have a complete supply both as regards purity and quantity at any time.

Highway Work in China

It is announced that work on the construction of the various projected highways in the Chinese provinces of Kiangsu, Chekiang and Anhwei, namely, the Hangchow-Kweichow, Kweichow-Wuhu, Wuhu-Nanking, Nanking-Shanghai, Shanghai-Hangchow and Soochow-Kashing lines, will be commenced simultaneously. It is understood that an appropriation of one million dollars has already been made by the Ministry of Finance to cover the initial expenses. According to a resolution recently adopted by the National Economic Council, the construction of all these roads is to be completed before the end of August.—*Kuo Min*.

Air Conditioning*

The Plant at the Singapore General Post Office

A MOST successful air conditioning plant has recently been designed and installed by United Engineers Limited in the basement premises of Fullerton Building which houses the General Post Office in Singapore.

A considerable portion of the Post Office accommodation is situated below ground level and in consequence the normal humidity of the atmosphere renders conditions somewhat unfavorable with the limited possibilities of ordinary ventilation.

The system now installed is operated by electrically driven centrifugal blowers drawing fresh air from certain selected points outside the building and so placed as to be above the dust line of the street.

In addition exhaust blowers are arranged to extract the used air which is discharged into the outside atmosphere at points remote from the inlets.

The inlet blowers are four in number, two having each a capacity of 28,000 cubic feet per minute and two of 23,000 cubic feet each. All are direct coupled to 7 b.h.p. Crompton-Parkinson D.C. motors at 460-volts. The air is drawn through four banks of Ventex air filters, one set to each blower. For the larger blowers the bank is made up of 36 cells each 18-in. by 18-in. and for the smaller blowers 24 cells to each.



Fig. 1.—Exhaust Registers and Regulators

These filters are fitted with corrugated baffles so arranged that all the incoming air must meet the surfaces of the baffle plates which are coated with a special viscous fluid, which attracts and retains all the foreign matter that may be drawn in with the air stream.

That filters are easily removable in sections for occasional cleaning and re-dipping.

After passing through the filters the air is distributed by the blowers through a series of ducts to outlets so arranged that every portion of the interior of the basement is subject to the influence of the system. The total horizontal run of ducts amounts to over 1,500 feet in length. Diffusing

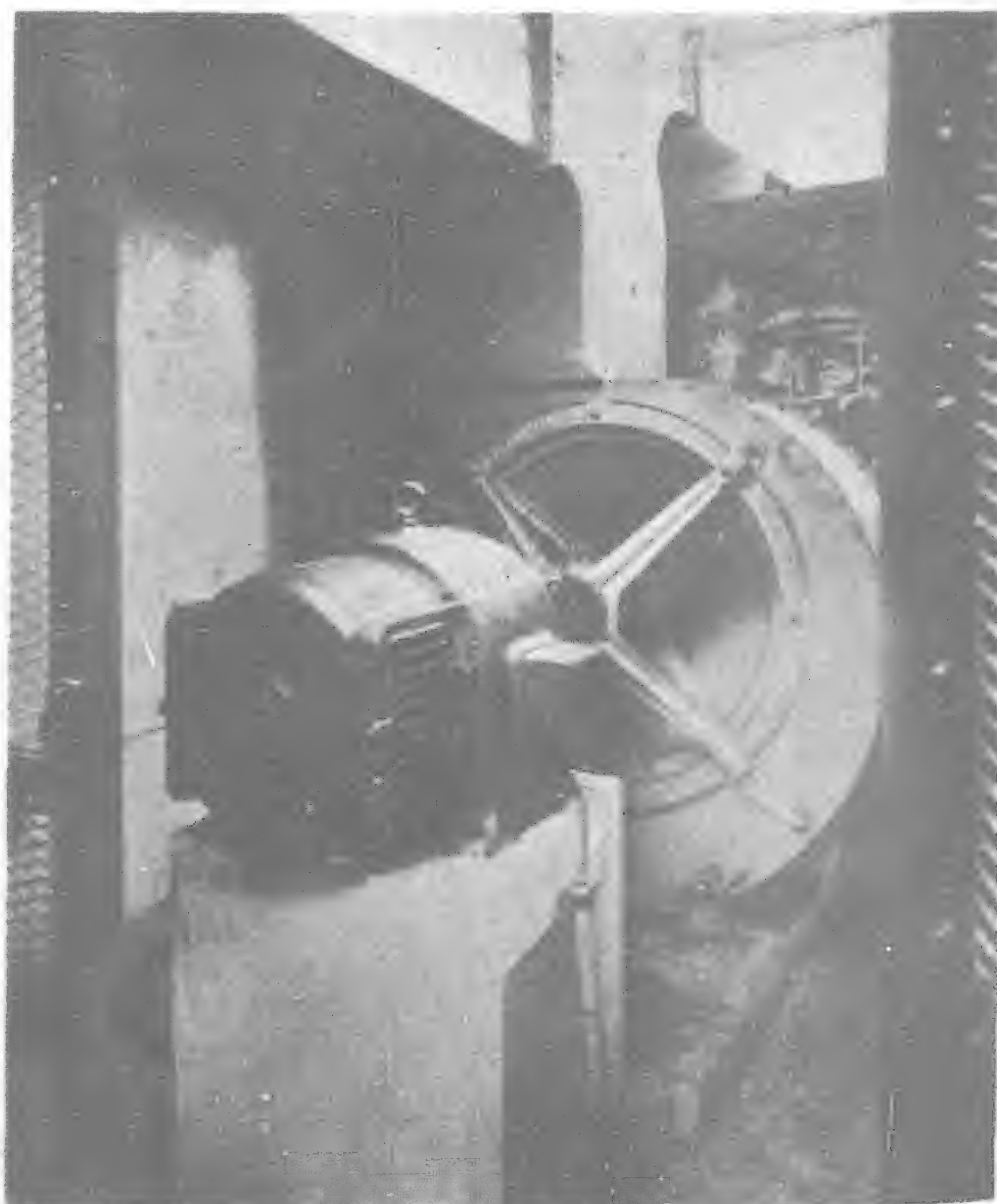


Fig. 3.—Inlet Blower and Motor, air is drawn through Filter Chamber in the background and discharged through ducts in basement

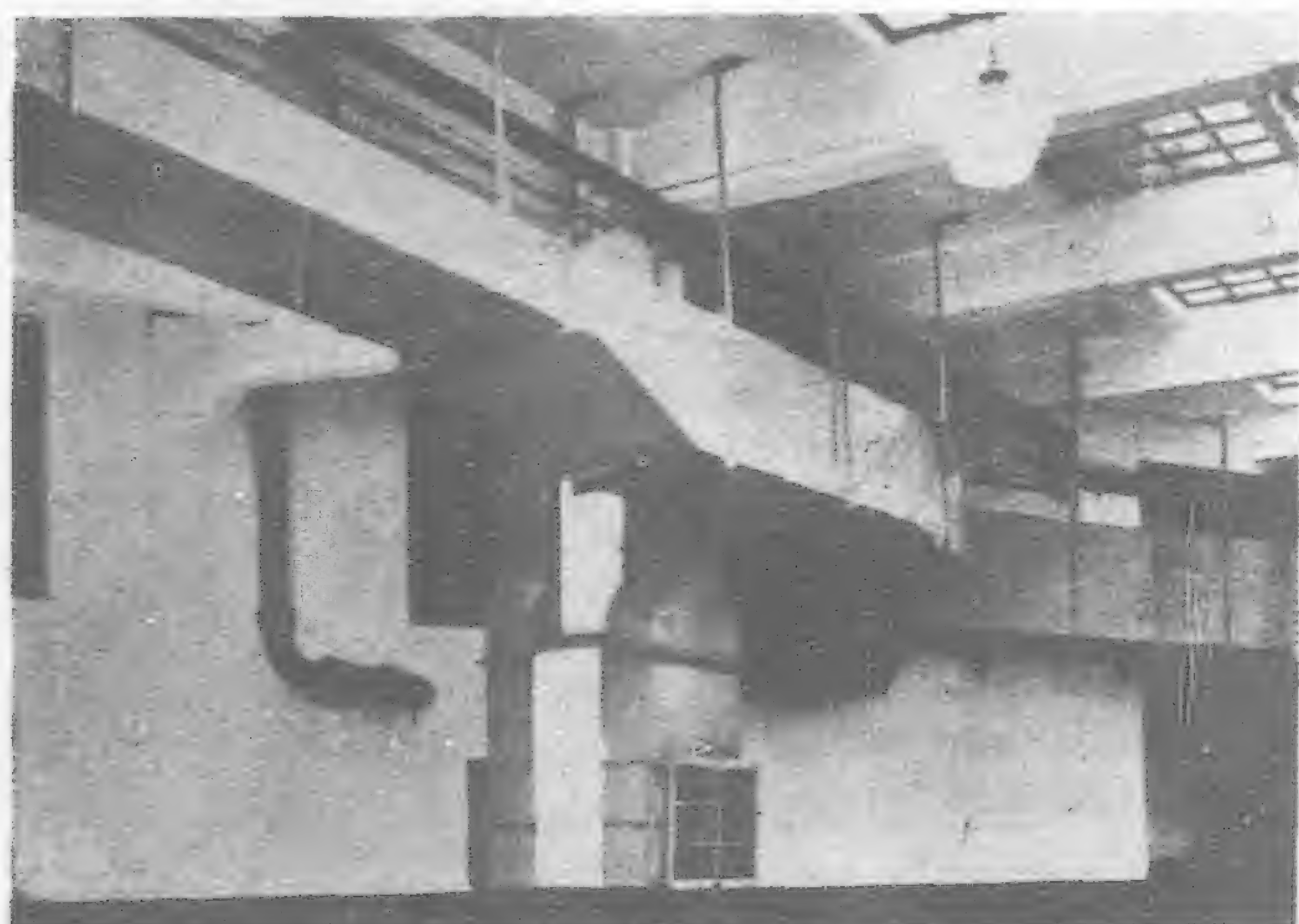


Fig. 4.—Section of Air Ducts and Inlet Diffusing Registers

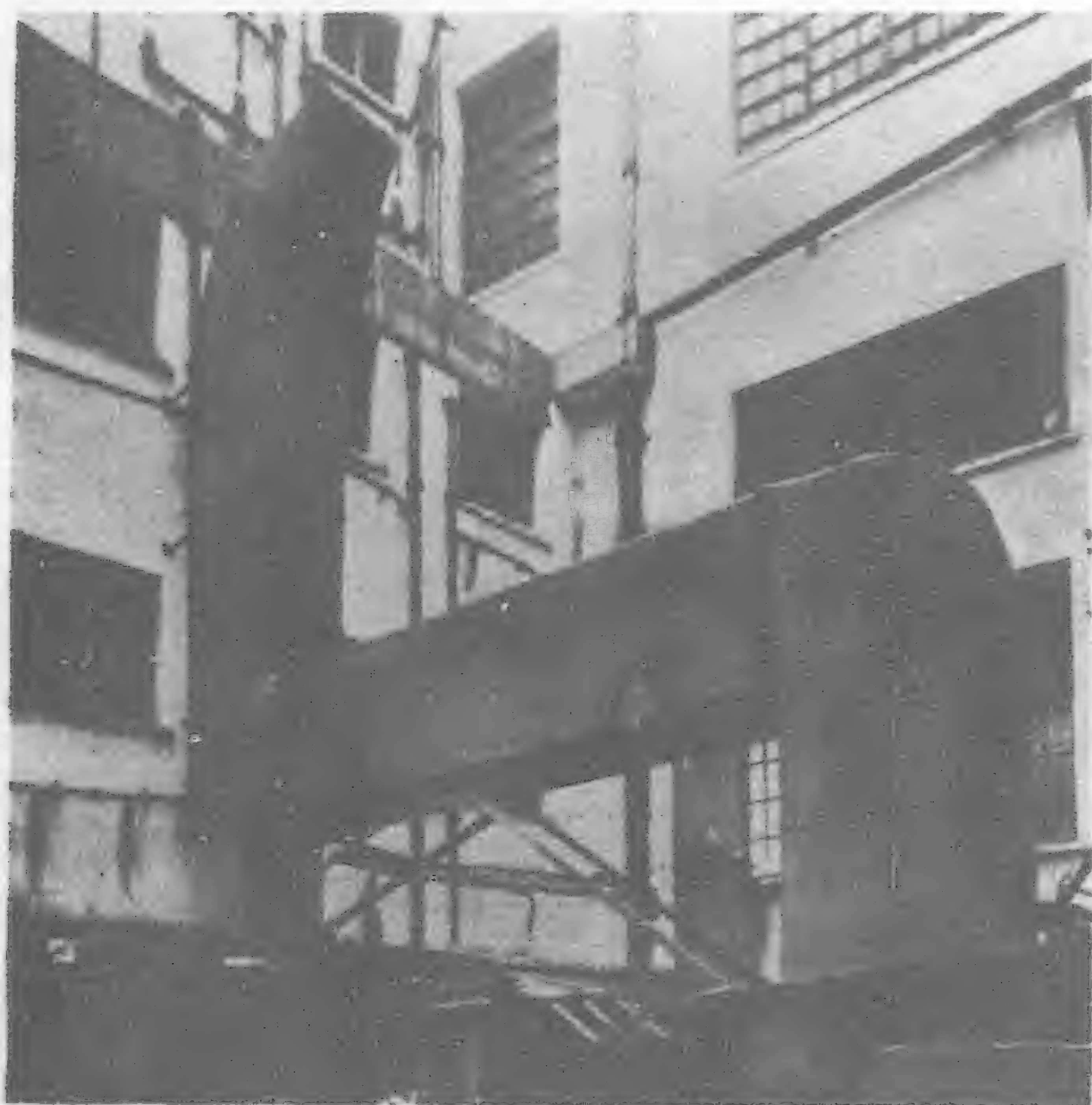


Fig. 2.—Exhaust Outlet Duct

*Journal of the Institute of Architects of Malaya.

registers are fitted to all outlets with regulating devices for controlling the discharge of air.

The exhaust is taken through similar registers. The main exhaust being operated by three blowers operating through three separate lines of ducts. Each blower has a capacity of 18,500 cubic feet per minute, the power being supplied by direct coupled 5 b.h.p. motors.

Two lesser exhaust systems are also fitted having blowers with individual capacities of 6,400 cubic feet per minute coupled to 3.5 b.h.p. motors.

Special electrical control gear is fitted to all units with automatic distant start and stop push buttons.

The installation is supplying filtered fresh air at the rate of five and a half million cubic feet per hour which accomplishes nearly eight complete changes of air every hour. The process is continuous and a gentle air current maintained throughout the building, in consequence the working conditions of the staff employed have been considerably improved and generous praise has been accorded to those responsible for the inception, the design and the construction of the system.

There is undoubtedly considerable scope for such installations throughout Malaya and where the closeness and humidity of the atmosphere is apparent in public buildings, stores or offices, an efficient system of ventilation should be installed in order to purify the air and maintain a reasonable temperature to the benefit of the occupants, thus avoiding that enervating effect and consequent loss of efficiency which incomplete ventilation produces.

Communications in Chosen

(Continued from page 321)

of passengers carried on private railways reached 2,788,000, the volume of freight 898,000 tons, and receipts Y.4,685,000.

Navigation

In the year 1912 matters relating to routes, ships, seamen, beacons, etc., were all systematized and placed under the Communications Bureau of the present Government, and during 1914-15 not only were the marine regulations unified and adjusted but a marine court was created. Before the annexation there existed a few small shipping concerns under government protection, and they were induced to amalgamate into one big company, the result of which was that the Chosen Mail Steamship Company came into being in 1912 and was ordered to establish regular coasting services. There are now ten shipping companies in Korean waters.

In 1910, ships of all kinds entered in the shipping register numbered only 88 with a tonnage of 9,300, but the regulations of marine affairs under the present régime led to great progress being made in maritime traffic, and especially during the Great War did the shipping business in Chosen enjoy an extraordinary boom. At present the number of lines regularly operated is 21 with 117 vessels aggregating 25,700 tons, their routes being (1) interport (2) Korea-Japan (3) Korea-China-Russia.

Year	Steamers		Sailing Boats	
	Number	Tonnage	Number	Tonnage
1919 ...	87	35,682	483	16,432
1925 ...	147	44,520	627	21,075
1926 ...	158	45,112	645	21,636
1927 ...	162	46,695	646	21,583
1928 ...	182	51,555	646	21,604
1929 ...	185	47,161	694	23,083

In 1903 four lighthouses were built, and by the year 1906 the number had increased to 53, but as this merely represented one signal for every 160 nautical miles, and navigation around the archipelago on the south-western coast was particularly dangerous during the foggy season, further great increase has since been made. The total number of navigation aids now stands at 259, comprising 127 night, 106 day, and 22 fog signals, in the proportion of one night signal to every 73 nautical miles of the entire coast.

Gold Mining and its Vital Importance to Manchuria

(Continued from page 314)

Moreover, since development is thereby retarded the Government and the community are the losers, not the foreign investors, who have other fields for the investment of their surplus funds. It must be borne in mind, in considering the question of foreign investment, that Manchuria needs the requisite capital to develop the natural resources and industries of the country and that every reasonable inducement should be offered to, and all proper and legitimate facilities provided, foreign investors to place their money at the disposal of the country for the purpose of its economic and general development. At the same time it must be recognized that any mineral, gold in our case, is the property of the community as a whole and the rights to mine for it should be granted to the individual or corporation on the distinct understanding that the interests of the community are safeguarded. A mine owner refusing a reasonable offer to develop his mine is behaving criminally towards the community and, unless he himself develops his mine, he should be dealt with accordingly. This is a problem which in the general interests of the community must be solved, otherwise the New Nation will find itself hopelessly tied up and retarded in its proper development owing to individual greed.

There is still another and extremely important point to be taken into consideration in connection with the fallacy of high taxes in the gold mining industry: it has been shown that only rich deposits can be mined if taxation is high, but this does not mean that after the rich deposits have been exhausted the poorer ones can be developed on a lower rate of taxation. The process of mining rich areas or the richer parts of any particular mines is known as "picking the eyes out" and once these eyes have been removed the whole industry may go blind when no amount of apparently favorable legislation can save it, for once the richer areas have been worked out the average gold contents of the remaining areas may be found too low to operate profitably even under the most favorable conditions whereas before the richer areas had been worked the average gold content of all the areas, rich and poor alike, was sufficiently high to allow of a large quantity of gold being extracted to the profit of everybody concerned.

The fundamental basis really is quite simple: what would be of the greater benefit to the community? A large amount of gold extracted, increased employment, vigorous trade and general prosperity extended over a number of years or a smaller amount of gold, limited employment, feeble trade with a few years of mining activity? The strength of a community or a nation is not measured by the amount the Government is able to collect in taxes but by the trade and the intensity and state of the development of industry.

In conclusion I would offer for the serious consideration of the authorities the following deductions:—

- (1) Gold mining is an essential industry.
- (2) Gold mining to be of any use and service to the community and the State must be conducted on a large scale.
- (3) Large scale mining requires the investment of a very large capital and the employment of highly skilled technical specialists.
- (4) A large investment in the gold mining industry is only possible when the industry is not taxed beyond the limit it is able to bear.
- (5) If capital is to be found abroad reasonable privileges must be offered in return for its investment.
- (6) Serious foreign investors look towards an investment over a period of years and money for the purposes of speculation or for a quick turnover cannot be found and, incidentally, should not be encouraged by the Government.
- (7) The security of titles, liberal and wise laws firmly enforced are essential conditions for the investment of capital especially if such capital comes from abroad.



Rice Fields, near Foochow, Irrigated by Sulzer Pumps

Sulzer Irrigation Plant in China

IN the Chang Lo district in the province of Fukien an irrigation plant is in service by means of which an arid district of about 8,900 acres has been converted into fertile rice fields. Already in ancient times the idea of cutting a canal through the mountains to lead water from the Lien Ping Kiang had been put forward, and this has now been carried out in several stages. Tributaries of the Min River flow through the south-western part of the district, which can therefore be irrigated naturally. In the east the land rises gradually, culminating in a mountain range, which stretches irregularly towards the sea coast. Between the sea and the mountain range lies a plain which cannot be irrigated from the Min River because of the mountains, but now receives water by means of the above-mentioned irrigation plant.

The area irrigated by the first stage is about 6½ miles long and three miles broad. For the rice fields, which can produce two crops annually, the quantity of water required is about 3-in. during the sowing period and the same quantity twice or three times during

the growing period. Thus more than one foot of water is needed from sowing time until harvest.

Owing to the lie of the land two pump stations have been installed, 1½ miles from each other. One station is located at Erh-Chiao and the other at Ma-Lin-Chiao. The Sulzer pumps, one in each station, deliver 110 gals. per min. and are each driven by a four-cylinder four-cycle Sulzer Diesel engine of 400 b.h.p.

The irrigation works are situated at a lonely place and communication is not easy. The engines and pumps were conveyed to Erh-Chiao by means of tugs. From there to the pump station the distance is only about two miles, but there are neither main roads nor vehicles, and low-lying fields had to be crossed. The light pieces could be carried by porters. As for the heavy pieces, some weighing as much as five tons, it was necessary to lay round logs parallel on the ground and load the machinery on strong boards fastened firmly together. It was then moved very slowly along the logs by means of ropes, pulleys and rollers.

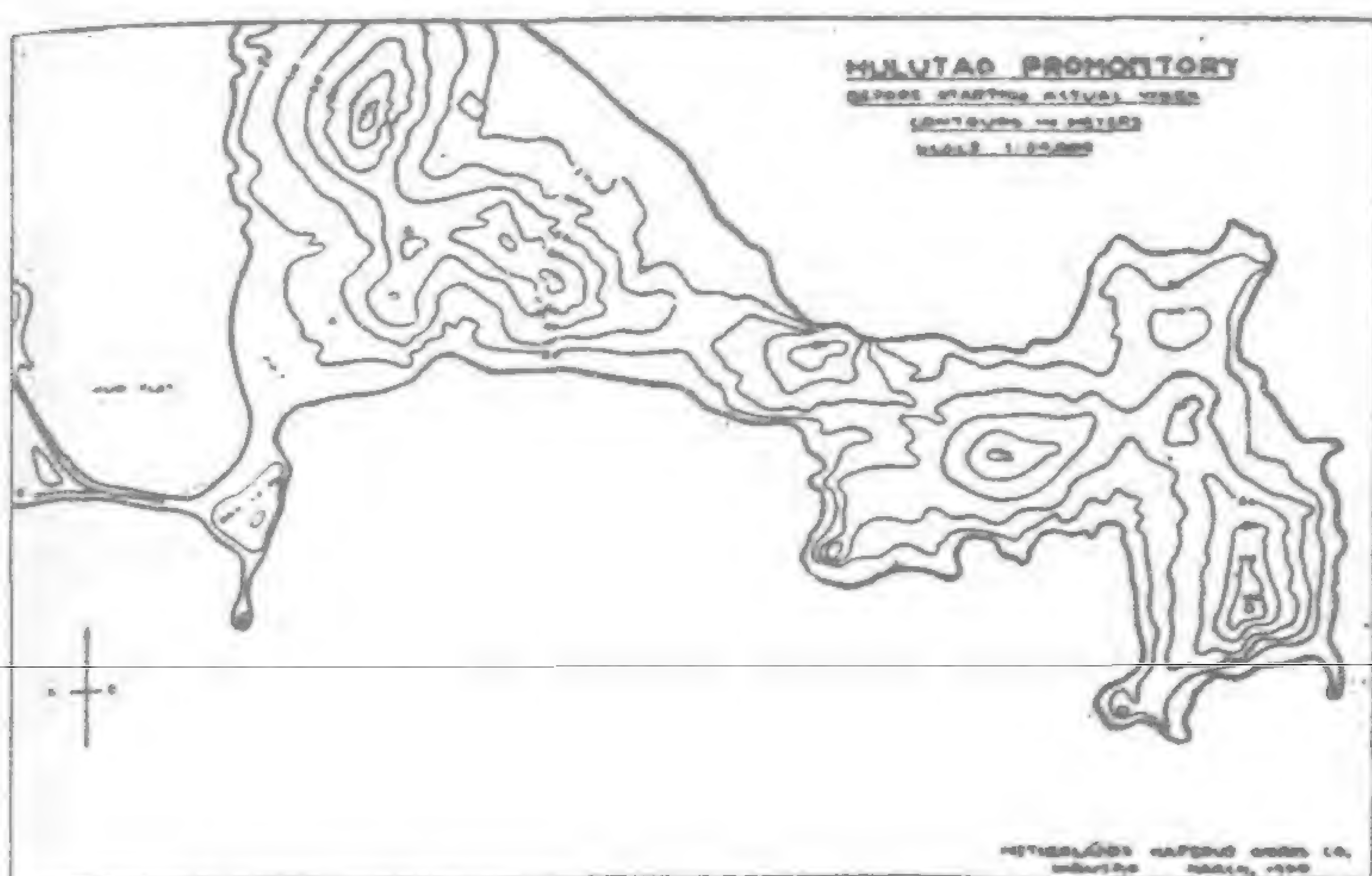


Transport of Suction Bend for one of the Sulzer Centrifugal Pumps in the Irrigation Plant near Foochow

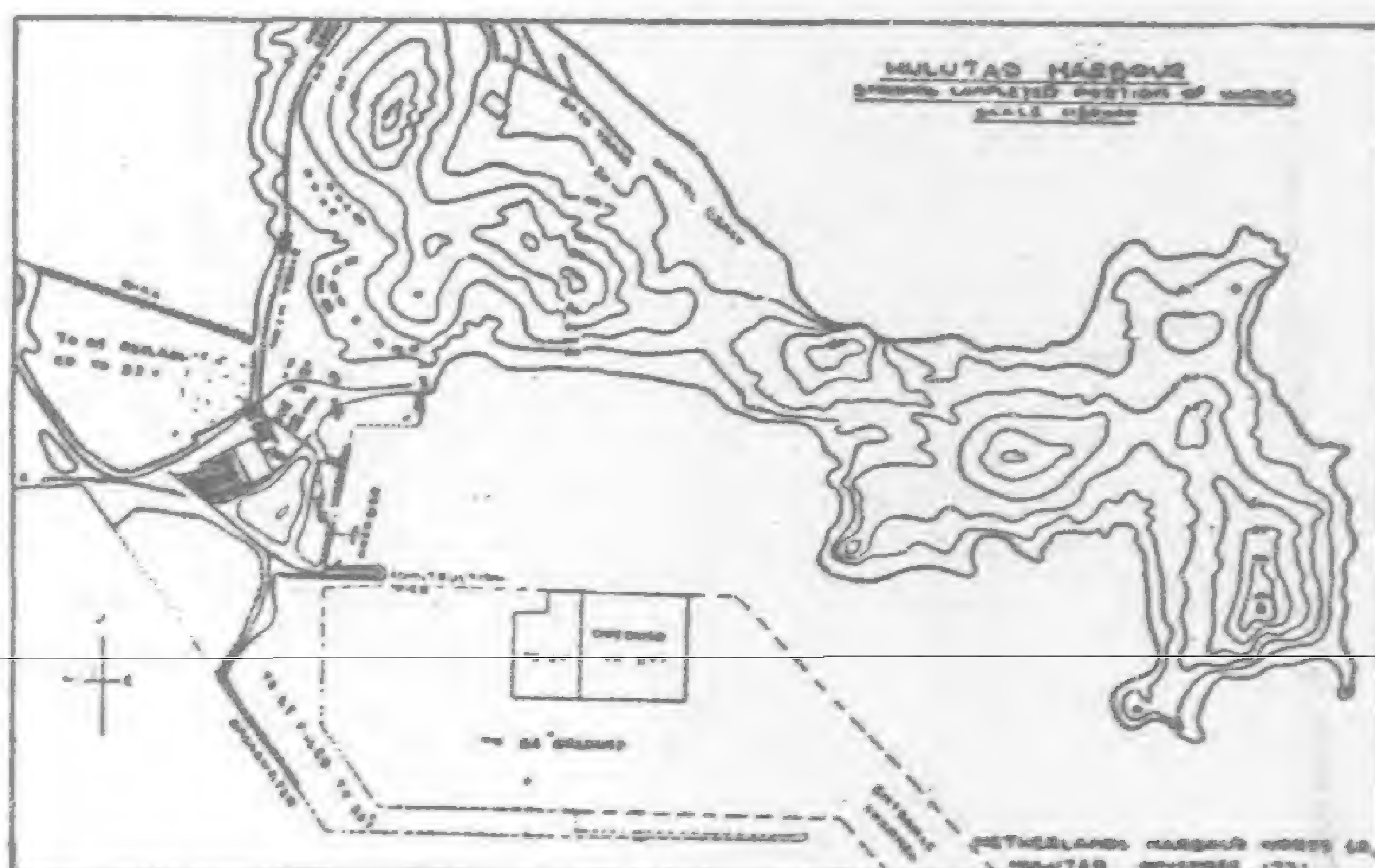
Mineral Wealth in Malaya

Iron ore mined by Japanese in Johore was among the exhibits at the recent Singapore Manufacturers' Exhibition, and this fact has brought out some interesting information showing how largely the Japanese are interested in the little-known iron ore deposits of Malaya. The biggest Japanese iron ore mine in Malaya is owned by the Nippon Mining Company, who operate at Kuala Dungun near the coast of Trengganu. But their output, about 200,000 to 300,000 tons per year, is not the largest among Japanese interests in Malaya. Isihara Sangyo Koshi, Ltd., have been mining in Malaya for twelve years, and operate at Batu Pahat, from where they export something like 500,000 tons per year to Japan, and at Kuala Dungun, Trengganu, also, where the production figures are in the neighborhood of 30,000 tons per year. Much is expected

of the iron deposits, acquired recently by the Toehigi Shoji Kaisha, of Kobe, on the upper forks of the Muar River, emptying into the Johore Straits. These deposits, which are estimated to run into tens of millions of tons, are said to be remarkably rich in their percentage of iron, containing as much as 65 per cent. The company is also interested in a hitherto unknown iron ore field in Kedah. It is said by the experts that iron ore is to be found all over the Malay Peninsula, and making a call to British capital in this connection *The Times of Malaya* points to the example of the Japanese. The time-honored question is asked: Why is it that under the British flag this kind of development is left to outside energy and initiative?—*Eastern Engineering and Commerce*.



Before Starting Work at Hulutao



Showing Completed Portion of Work

The Execution of Hulutao Harbor Works*

By G. A. VAN STEENBERGEN

As the interest in the construction of Hulutao Harbor is growing, it seems justified to publish a few notes for the enlightenment of those, who from a technical or economic point of view are interested in the construction work in progress.

From the very outset the contractors intended to use the most up-to-date plant and methods of construction, and consequently the preparatory measures had to be carefully and thoroughly taken.

The first year of construction (1930) was chiefly devoted to preparatory work, comprising the construction of repair shops, stores and godowns, offices, living quarters for staff, quarters for laborers, hospital, etc. A power station for the supply of electric current and fresh water supply installation and slipway completed the technical outfit.

The Repair shops consist of a mechanical workshop (area 800 M²) with 23 workshop machines, a locomotive repair shop (area 400 M²), an electrical workshop (areas 120 M²) and carpenter shop (area 500 M²) with three sawing machines and one planing machine. Connected with the mechanical workshop are a small ice factory, capacity 650 KG/day and an air-compressor-house.

All machines are driven electrically, either by means of belts or with direct-coupled electromotors.

The Stores comprise one general store (area 550 M²) in which over 3,000 articles of hardware and sundry supplies are to be obtained. Owing to the great distance to the nearest center where a regular market for these articles exists (Tientsin or Shanghai) it has been necessary to be as much self-supporting in this respect as possible. Two more stores (area 600 M²) contain spare parts, supplied by the manufacturers of different engines and machinery in Europe and America and miscellaneous machinery laid up.

In the quarters for staff, constructed partly in brick, partly in locally obtained masonry stone 100 members of Chinese and foreign staff are living, many with their families. All houses are supplied with electric light, and many have central heating, steel windows and modern sanitation. The quarters for laborers have a capacity for 3,000 men, with detached roomy kitchens.

The hospital (area 640 M²) has four private patient rooms, one operation room and a ward for 60 beds.

The Power Station has a capacity of 1,100 kw. and consists of two turbo-generators for 750 and 350 kw. respectively. Steam for the turbines is supplied by two Babcock & Wilcox boilers, consuming about 15 tons of Peipiao coal per day.

However, this installation together with the building, erected on reclaimed land near the seashore, has been very costly, the contractors' decision upon its purchase being chiefly due to their desire to have one central power house of sufficient capacity to supply the necessary current for all purposes connected with the harbor construction. The careful study for a system of power supply

prior to its adoption was necessary not only for its economy, but also for its absolute reliability. However, auxiliary be its service to the civil engineering works, any failure in the source or distribution of electricity supply would entail serious consequences. The large output (500 cy per day) of the concrete factory required during the comparatively short working season, should not be impaired by any interruption of the current supply.

Coal, being cheaper than oil, was finally a decisive factor in the choice of steam engine against combustion engine.

As the current is to be supplied in a wide range up to distances of one mile from the power station, high tension of 3,000-volts is advantageous in avoiding heavy losses.

Three transformer stations have been erected, one for the north beach, where gravel and stone for concrete are produced; a second for the concrete factory and a third for the Titan crane, with which blocks are set in the breakwater. Three miles of high tension and 10 miles of low tension (220-volts) cables have been laid.

The coal yard where the fuel for the power station is stored is directly connected to the P.L.R. by normal gauge track.

During the first year of construction when less current was required and the power station not yet completed, a 85 kw. Diesel engine directly coupled with a generator served to meet the current demand, and is now kept in reserve for emergency.

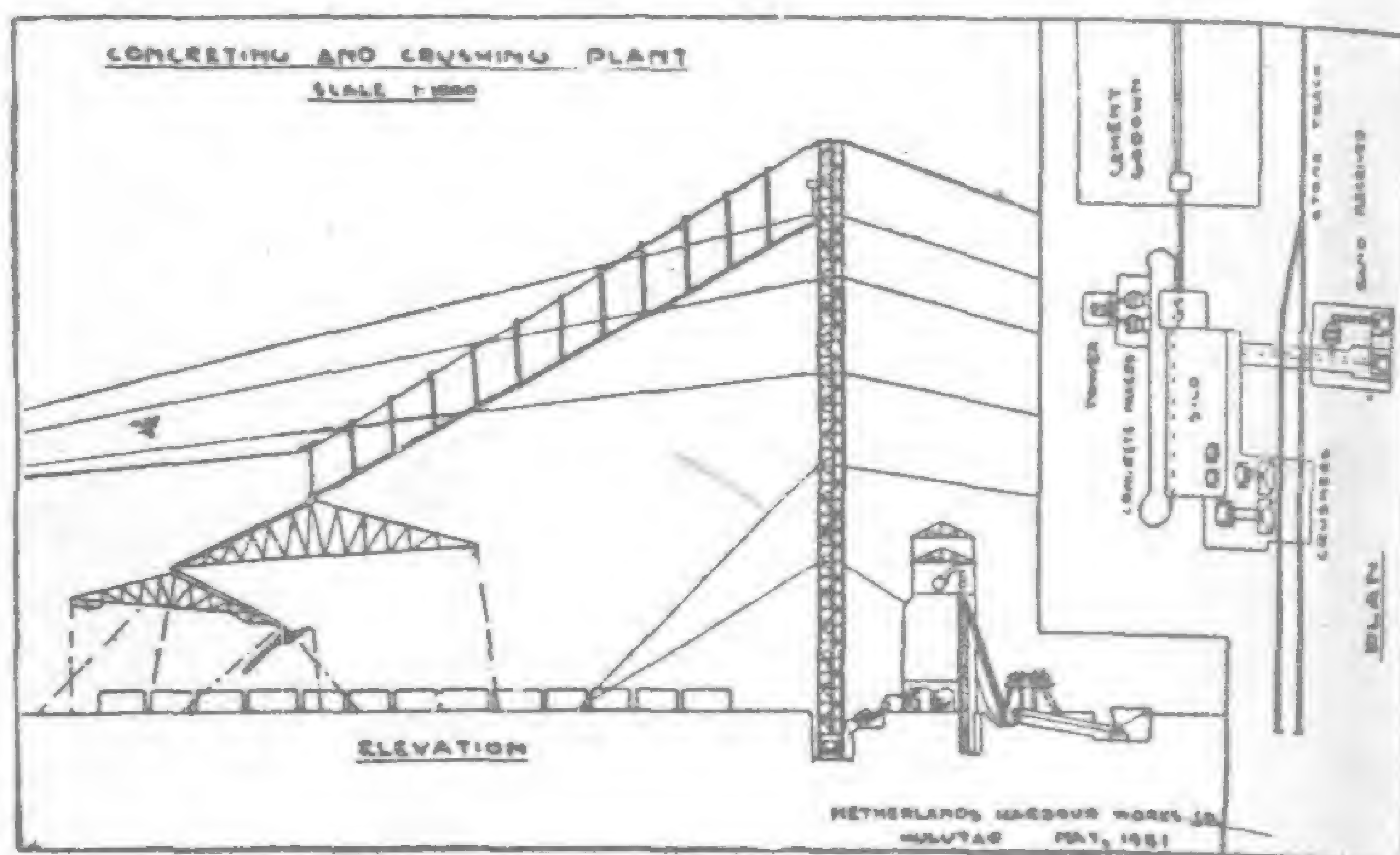
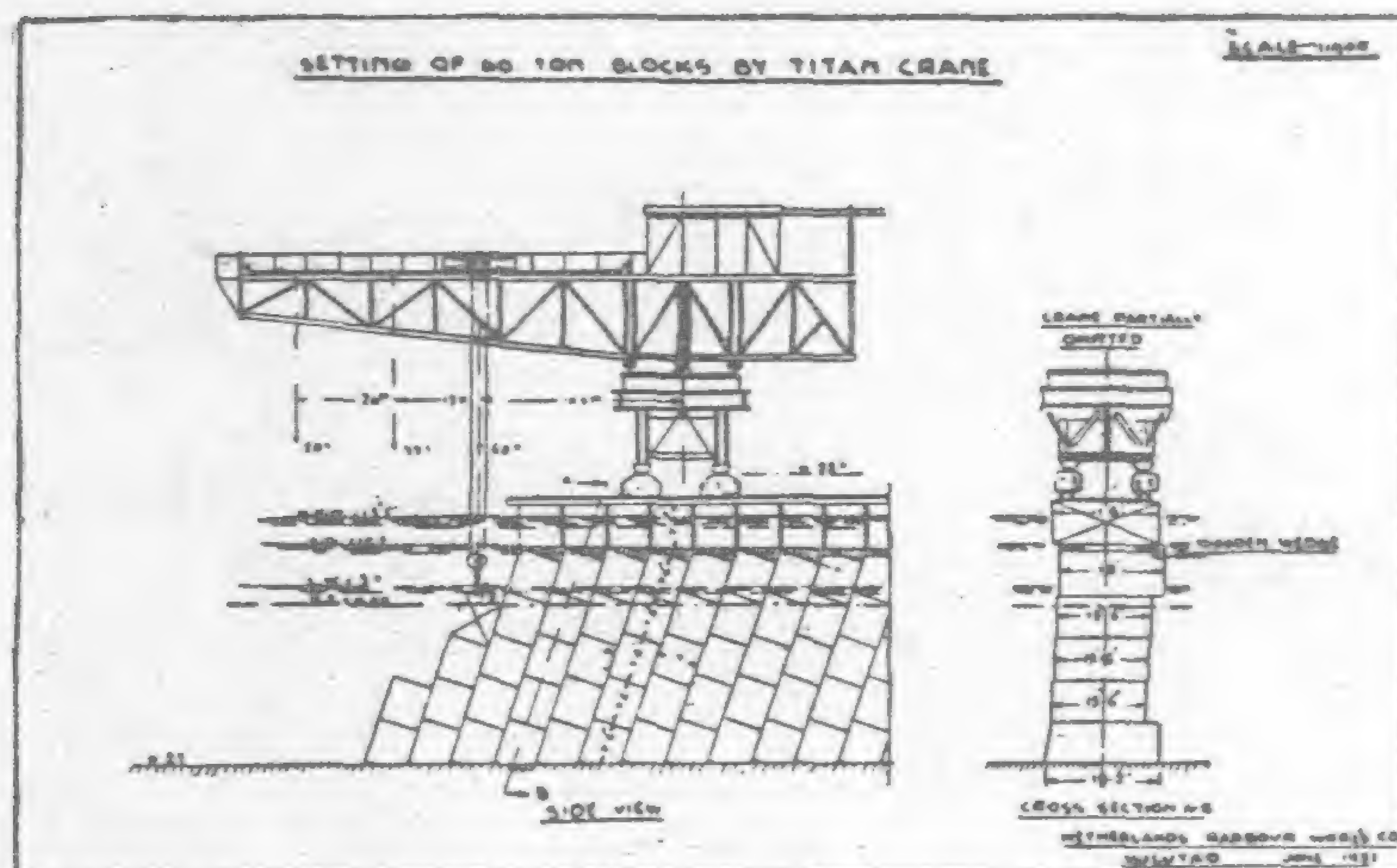
A fresh-water supply was the last, but not the least, important work for general preparation.

The geological formation being unfavorable for artesian wells, a 5-in. pipeline has been laid from Hulutao to a river some five miles away. From there the water is pumped into a reservoir in the hills to the west of Hulutao, where a second pumping station delivers the water into two masonry tanks on top of the hills from where it gravitates through two 3-in. mains down to the workyard. Power station, locomotives, concrete factory and floating plant are fed by separate pipelines from the mains. In total eight miles of piping have been laid.

Actual work.—During the period of preparation in 1930 the execution of actual work was not neglected, most of it, however, being executed by human labor, which after the arrival of the plant, was gradually replaced by machine-power.

Construction Pier.—The first job taken in hand was the construction pier, which was constructed by dumping stones excavated from the hills. This pier now being completed with a length of 900-ft. provides an excellent shelter for the floating plant against the frequent strong gales from the south and south-west. During the first year of construction heavy damage was done to the floating plant owing to the exposed anchorage before the completion of the construction pier, which is now fully serving its purpose.

*Journal of the Association of Chinese and American Engineers.



Excavation.—The excavation of two hills situated within the future industrial yards was started by human labor which has since been replaced by Bucyrus motor shovel of 1,500 cy. a day capacity. Pneumatic drills have greatly assisted in tunnelling operations thus affording blasting on a big scale which is undoubtedly the most economical method for the slatish material encountered.

The Bucyrus (type 50-B, Atlas Diesel engine, bucket contents 1 M³) delivers the excavated material into self-tipping cars on 90 centimeter gauge with 5 M³ capacity.

5,000-ft. of dyke have been constructed, 500-ft. of which serve to link up the S.W. breakwater with the shore (connection dyke). An area of 28 acres has been obtained by dry excavation; the greater part of this area is now occupied by the contractors' block-yard and workyard.

Dredging.—A quantity of about 600,000 cy. has been dredged by bucket dredger from the harbor basin and foundation channels for breakwater and quaywalls.

No special difficulties have been encountered in dredging, the soil being a sandy mud, very useful for reclamation purposes, with, however, many loose boulders which had to be removed from the top of the buckets during dredging or from the barges.

The harbor basin must be dredged to a level of 27-ft. below Hulutao zero, one section even to 32-ft. below this datum. On these depths a stiff yellow clay is found, very suitable for foundation of quaywalls.

Part of the dredged material has been dumped by means of self-discharging hopper barges, about 400,000 cy. being pumped ashore over a distance of about 2,000-ft. by the twin screw hopper suction dredger *Hankow*, forming valuable reclamation ground east of Hulutao railway station.

In addition to the dredgers three tugs and five hopper barges maintain the transportation of the dredged material.

Building materials.—Since the commencement of works the following material for the construction have arrived at Hulutao (excluding four tows from Hongkong and Macao).

Material	Quantity	from
Cement	480 railway cars	Tangshan
Coal	360 railway cars	Chinwangtao and Peipiao
Miscellaneous goods	170 railway cars	Tientsin
Wood	600,000-ft. B.M.	U.S.
Machinery	1,650 tons	Europe
Wood	11 Junkloads	Antung

Concrete factory.—The quaywall and break water consist of a main body of 60 tons blocks, which are all precast and set later on. As coarse aggregate for the concrete broken stone and gravel are used, both materials being obtained at, and conveyed from, the North beach of the Promontory by means of trains on 90 centimeter gauge track, constructed over a length of about two miles from the beach to the block yard. The gravel is washed on the beach before being loaded in the cars.

The self-tipping cars with a capacity of 5 M³ each discharge their load upon arrival on an elevated platform at the concrete factory. The stones and also the gravel above the desired size of 2.5-in. are crushed by stone crushers, the broken material being thereafter conveyed by means of an elevator into silos (height 23 M., total capacity 730 M³).

The sand is found on beaches south of Hulutao and transported by junk; after being unloaded it is deposited into a receiver whence it is brought by a belt-conveyor and elevator into a separate silo (capacity 350 M³).

Cement is stored in godowns near the concrete factory and conveyed by tube to an automatic weighing-device, from where it enters one of the concrete mixers (capacity 30 M³/hour each) together with the sand and coarse aggregate collected underneath the silos from patent-valves by cars suspended on a circuit rail.

After being mixed in the proportion of one cement 2.5 sand and 4.5 gravel or broken stone, the ready concrete is hoisted in the bucket of the concrete placing tower and deposited through the chutes into the steel block moulds. In total about 35,000 cy. of concrete blocks have been made.

The casting of one 60 ton block takes about 40 minutes. The height of the placing-tower is 70 meters and the hoisting speed 2 M/sec. The block yard is divided into 10 block streets and fitted out with two 60 tons travelling portal cranes for lifting blocks and two 6.5 tons portal cranes for transporting the steel block moulds.

Blocksetting.—As mentioned above the construction of quay walls and breakwaters is in block work, the 60 tons blocks being set in sloping bond.

The bottom blocks are set upon a rubble mound carefully levelled off by divers, so as to form a true bed for same. Prior to depositing the rubble a foundation-trench is dredged, thus removing the mud until a bottom of sufficient consistency for foundation is reached.

Up to September, 1931, all blocks have been set by floating sheerlegs, by which the blocks were lifted from the 60 tons trucks on which they were transported from the block yard and put on barges.

Since the completion of the assembling of a 60 tons Titan crane, constructed by a well-known shipyard in Holland and shipped directly to Hulutao in parts by a special steamer, the block setting has been largely taken over by this crane. The crane is able to travel, hoist and swing with a sixty tons block and compares favorably with the floating crane as the former is much more stable, which fact is of considerable advantage for block setting. The level of the top-blocks being about 9-ft. above Hulutao zero and ordinary high water being about 11-ft. above this datum, the Titan crane could not travel directly over the top-blocks of the wall. Auxiliary blocks had to be set on the saw-teeth shaped top of the top-blocks by means of wooden wedges, as seen in the sketch. The track for the Titan crane could thus be laid on the level of about 16-ft. above Hulutao zero, i.e., about two feet above highest high water.

Block setting in general has been very much hampered by adverse weather conditions throughout the year. Only June, July and October have brought more than 15 workable days for block setting. Frequent gales from the southern and south-western direction render block setting operations impossible, whereas many days are lost on account of murky water after the storms have subsided, causing complete invisibility for the divers to work. After setting of every block measurements must be taken, so as to ascertain that its position is correct in comparison with the blocks previously set, which work requires not only considerable

(Continued on page 336).



General view of Colombo Harbor, Ceylon

Development of the Port of Colombo

By U.S. Assistant Trade Commissioner *WILSON C. FLAKE* of Calcutta

THE importance of Colombo as a port of call, derived from its location on the direct sea route between the Suez Canal and the Far East, was demonstrated clearly in 1931 when the port was visited by 2,886 vessels aggregating 20,805,000 tons, including 70 ships (538,000 tons) under American registry.

Because many of these ships called at Colombo principally to fuel, the cargo tonnage that passed the customs lines was small in comparison with the number of vessels. Also, the 2,886 ships in 1931 included tourist boats, bringing the number of vessels engaged in foreign trade down to 2,869 ships of 12,563,000 tons.

Aside from transshipments and bunkering fuel, the principal import cargo handled at Colombo includes rice, cotton goods, petroleum products, fertilizers, and sugar; the chief exports are tea, rubber and coconut products, which in 1931 accounted for 92 per cent of the value of Ceylon's exports.

Colombo's Rise as a Port

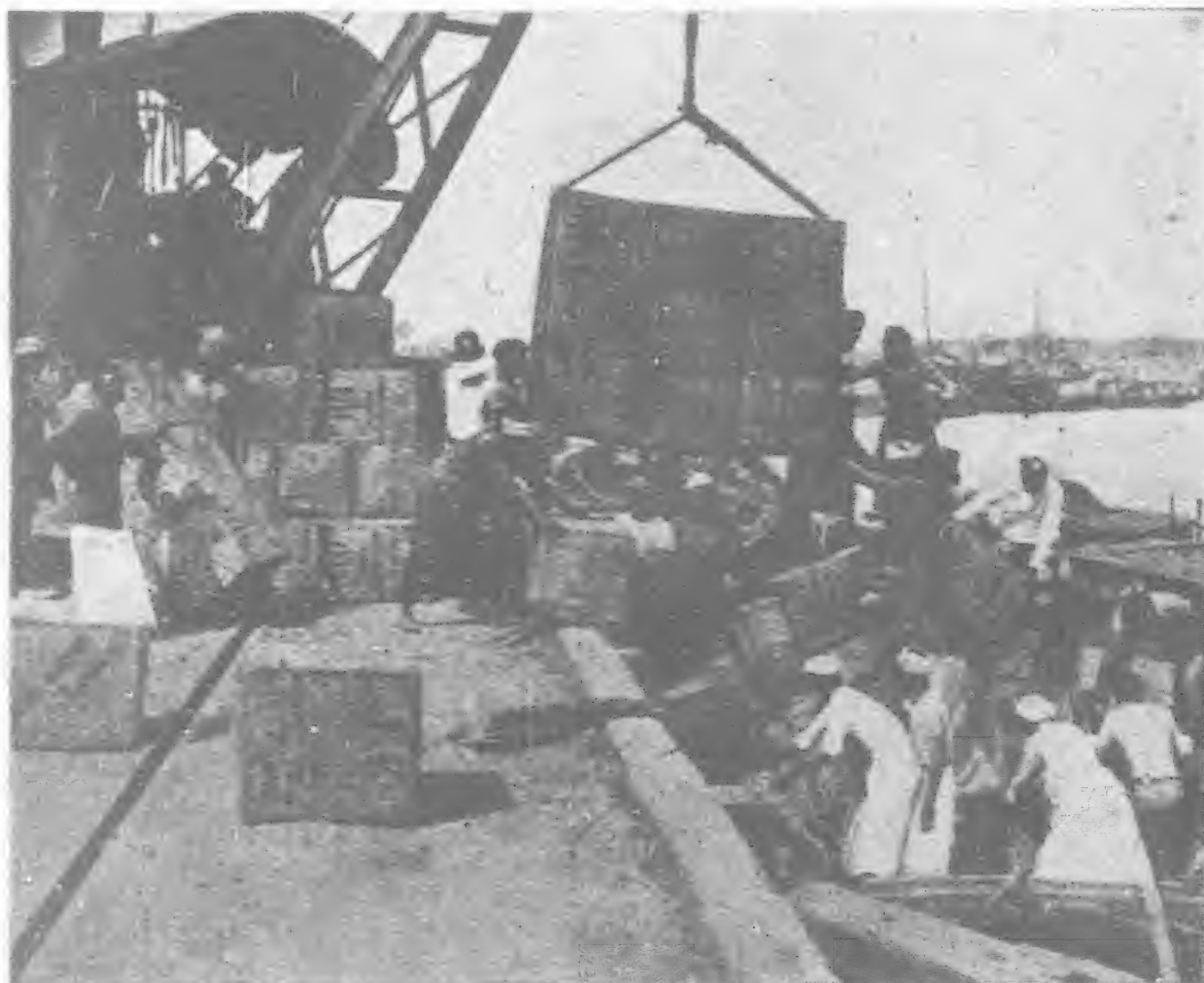
The rise of Colombo to its present high position among world ports came after the completion of breakwaters there made its artificial harbor, constructed out of an open anchorage, much preferred to the less secure harbor at Galle,

a small port on the southern end of the island which had before that time been the chief port of call on the island but has now lost much of its former importance.

The principal registry of vessels that called at Colombo in 1931 was, of course, British, followed by German, Japanese, Netherlands, Italian and French. The one United States line until recently used Colombo as the port of call for all traffic with India, but now calls also at Calcutta.

The breakwaters at Colombo are built out into the open sea and the approach to the harbor is free from navigational dangers. The harbor, which has a sheltered water area of 643 acres at low water, is completely inclosed. There are two entrances—the western entrance channel being 630 feet wide, with a navigable depth of 36 feet at low water, and the northern channel 550 feet wide, with a navigable depth of 30 feet. Vessels drawing up to 27 feet can enter by the northern entrance; the western entrance can accommodate ships drawing 33 feet.

The problem of the port commission is to keep ahead of the Suez Canal as regards the size of vessels that can be accommodated. Consequently, an area of 186 acres of the harbor has been dredged to 36 feet, 102 acres to a depth (Continued on page 343).



Tea being taken from the Dock to Lighter for Loading on Vessel in Port of Colombo

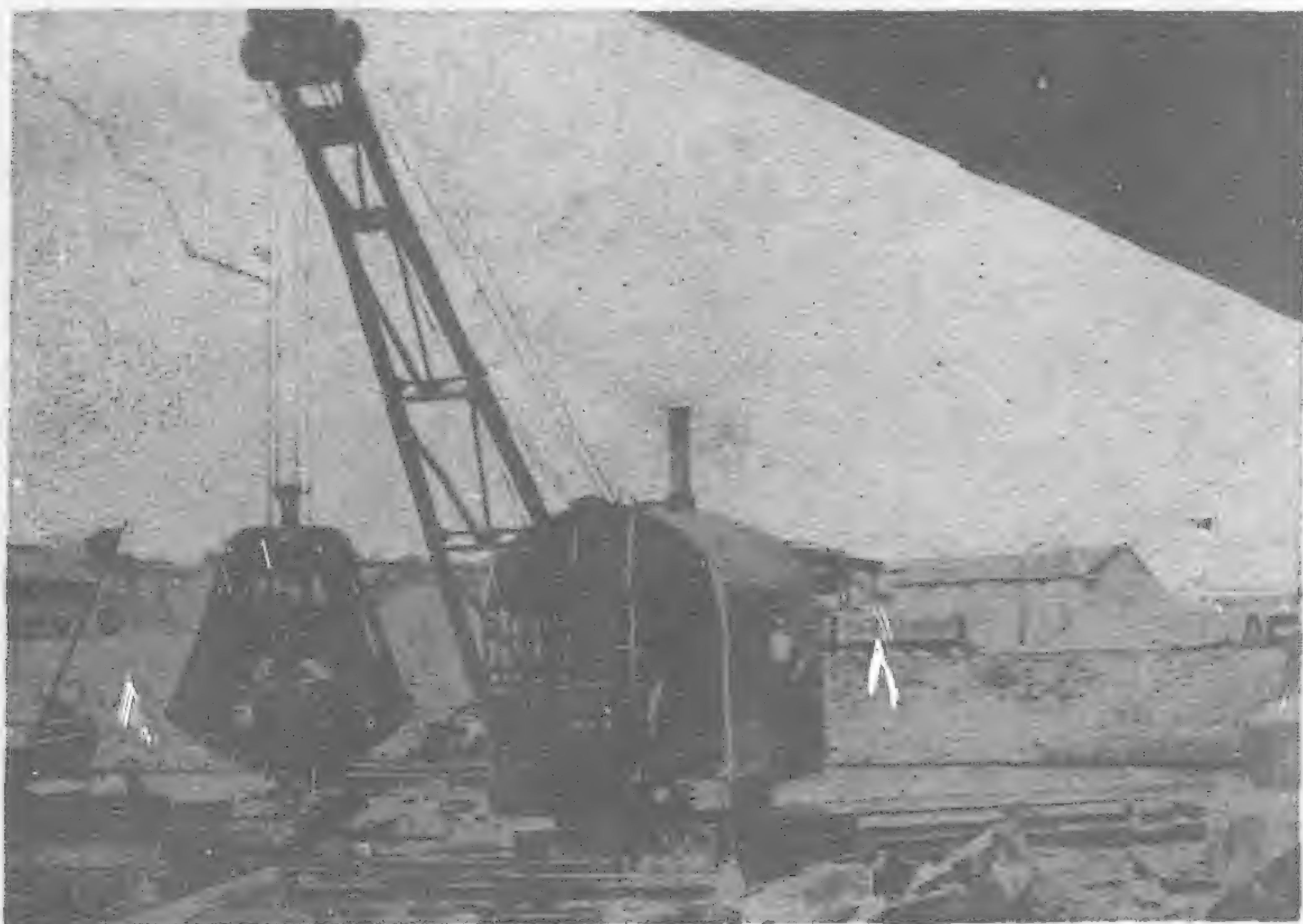


Fig. 5.—Floating steam crane with "Polyp" grab engaged in removing the foundation of a bridge pier after blasting operations.



Fig. 6.—The "Polyp" removes with ease not only natural soil and small stone but large blocks of stone as well.

Floating Cranes for Construction Work and Dredging in Rivers and Canals

BESIDES the well-known bucket dredgers, floating slewing cranes or grab dredgers are, on account of their mobility and adaptability to the most varied purposes, frequently employed in the conservancy of inland waterways, for, besides the purely constructional and dredging work, they can be used for the transshipment of material or to render assistance in the case of accidents to ships, for the carrying out of repairs, the salvage of cargo and the clearing of the fairway. The Rhine Conservancy Board in Coblenz, for instance, has a crane and salvage ship, with workshop on board, principally intended for use in case of accidents to ships and the extinguishing of fires, but which can also be put into service in connection with the general conservancy of the river. The ship is, for this purpose, fitted out with all manner of auxiliary appliances, such as slewing cranes, pumps, pile driver and a fully equipped fitter's shop (supplied by the DEMAG, Duisburg).

The hull of the ship (Figs. 1 and 2) is 122-ft. in length, and 33-ft. in breadth, with a draught of 5-ft. Current for the electric motors of the two propellers, the various lifting appliances and other auxiliary machines is supplied by a Diesel-electric power plant. There is, besides this, a small auxiliary aggregate, consisting of a 12 h.p. motor, an auxiliary dynamo and a small compressor that supplies the air for the starting of the main engines. The auxiliary dynamo supplies the current for the workshop, the pile driver, the deck winches and the lighting plant.

The advantage of the ship being driven by Diesel engines lies in its being constantly ready for action, so that it can set off immediately in the case

of an accident. Were it driven by steam, it would be necessary for this purpose to keep steam up continually.

The workshop, equipped with forge chimney, anvil, lathe, shaper, high-speed drilling machine, tool grinding machine and a fitter's bench, is situated over the engine room. The cabin and bunks for the crew are in front of the main crane, and above them are the wheel-house and a consulting room.

The grab slewing crane has a carrying capacity of six tons at a 60-ft. radius, measured from the axis of rotation, and the jib can be hauled in under load. The carrying capacity at a radius of 33-ft. is 11 tons. The hoisting gear has two drums, thus permitting it to be used both for grab and piece-goods service. With the jib luffed-in, the grab can also be lowered 33-ft. below the surface of the water. According to the nature of the material to be recovered, either a light coal grab, an ore grab, both of which are also suitable for the recovery of sand and gravel, or a special type of stone grab can be used with the crane.

Besides the main crane, there are two further lifting appliances on board which can be moved by the main crane to four different points, as required. The carrying capacity of these cranes is $3\frac{1}{2}$ tons at a radius of 6-ft. 8-in. The hoisting gear is located on the rear jib, high enough to allow it to clear the deck superstructures. Current is supplied over a flexible cable with plug contact.

The pumping installation consists of a stationary, low-pressure pump, which, at a speed of 1,000 r.p.m., can pump 785 c. yds. per hour to a height of 33-ft., and three movable, high-pressure pumps, each of which can pump 118 c. yds. per hour to a height of 167-ft. The three high-

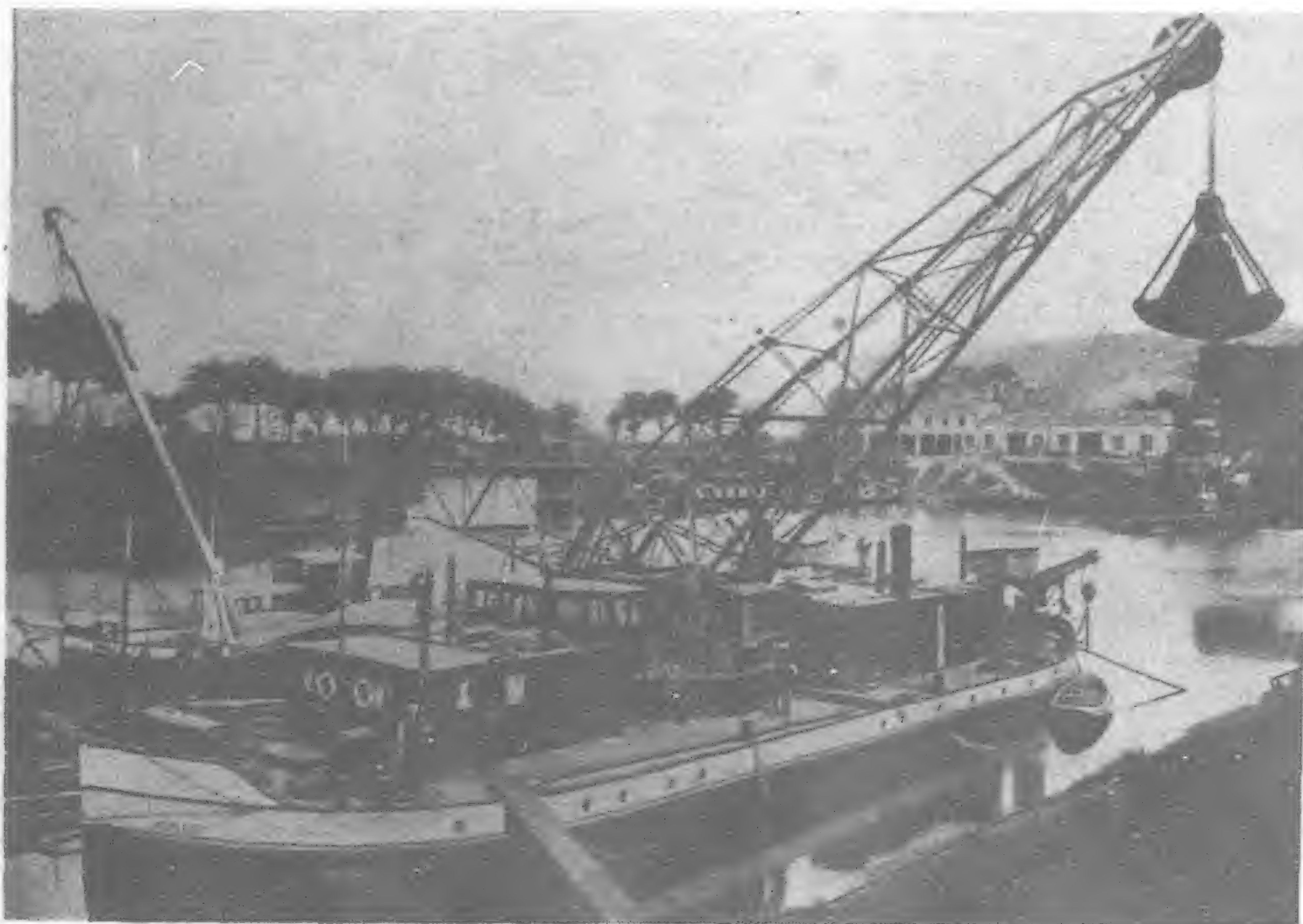


Fig. 1.—Crane and Salvage Ship Koblenz with workshop

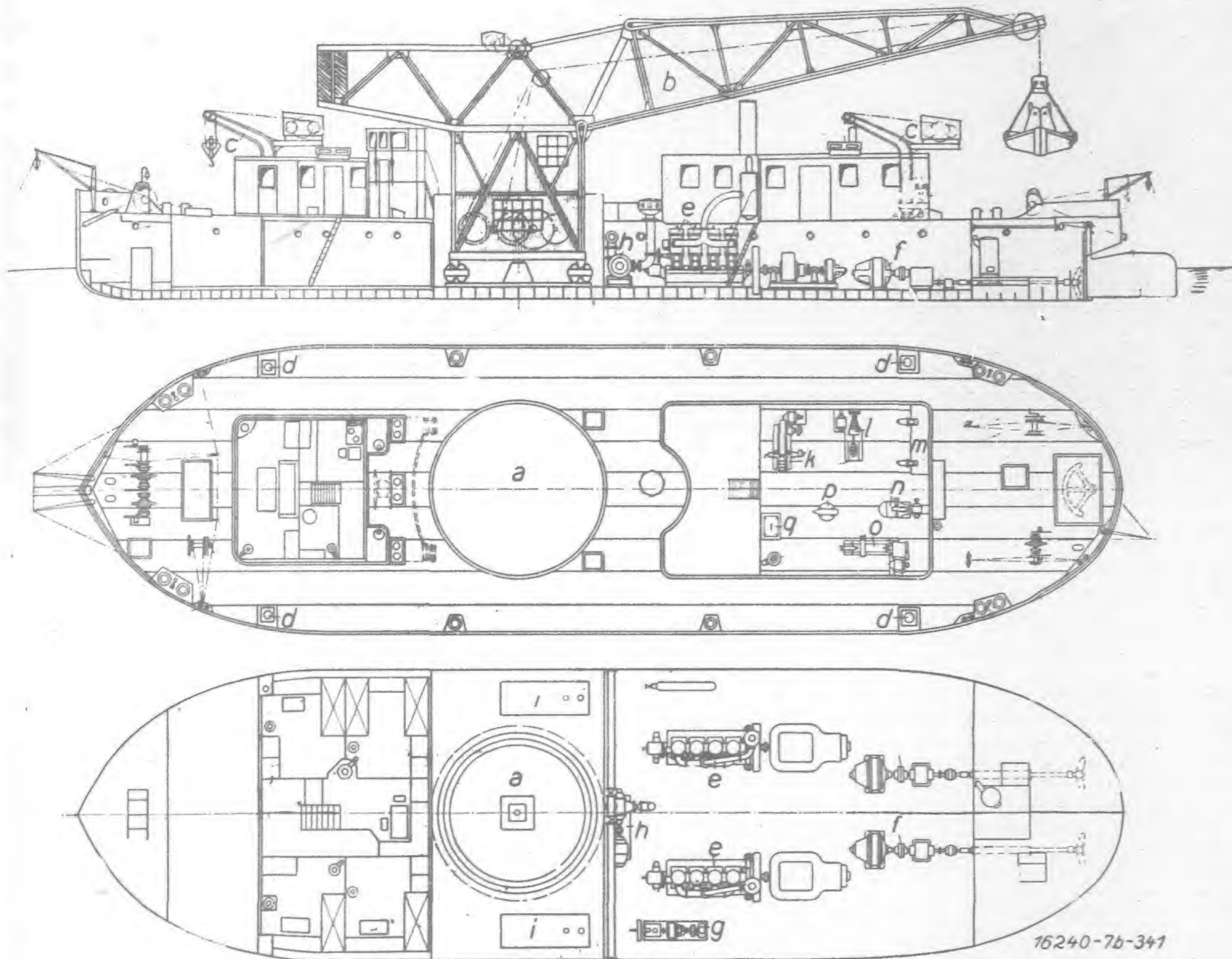


Diagram of the deck and engine room of the crane and salvage ship (Fig. 1).

- (a) Crane bulkhead
(b) Stationary grab slewing crane
(c) Movable slewing crane

- (d) Conical sockets for the movable slewing cranes
(e) Main engine and dynamo
(f) Electric propelling drive

- (g) Donkey set consisting of crude-oil engine, dynamo and starting compressor
(h) Low-pressure centrifugal pump driven by electric motor

- (i) Fuel tanks
(k) Shaper
(l) Drilling machine
(m) Fitter's bench

- (n) Grindstone
(o) Lathe
(p) Anvil
(q) Forge

pressure pumps can be set up at any desired point and connected to the current supply system by plug contacts. The pile driver, that is likewise moved along by the crane, is also connected to the current supply system in the same way. The drop weight of the pile driver is 1,322 lb., with a maximum drop of 23-ft. 4-in.

Much as it is to be desired, it is, however, not possible for all river and canal conservancy boards to purchase such a finely equipped crane ship as the one described above, so that, in many cases, they have to get along as well as they can with cheaper methods. The Neckar Conservancy Board, for instance, has a



Fig. 3.—Floating crane with benzol engine dredging stones from the Neckar by means of a stone grab.



Fig. 4.—Standard steam crane mounted on caissons dredging a river bed

floating crane which, although not so completely fitted out as the Coblenz boat, has nevertheless already rendered inestimable service in the conservancy of the Neckar and in connection with the various structures along its course. A pontoon was formed out of two barges joined together by a trestle framework of structural steel and provided with a through-deck. A standard DEMAG slewing crane, driven by a benzol engine, was mounted on the trestle, and a few bollards and hand winches, pumps and anchor complete the equipment (Fig. 3). For grab service, the slewing crane has a carrying capacity of three tons at a radius of 23-ft. The jib can, however, be let out to a radius of 30-ft. when it can take piece-goods up to two tons or it can be luffed-in to a radius of 16-ft. for taking loads up to six tons. Fig. 3 shows the crane engaged in dredging stones from the Neckar with a special stone grab. A standard clam-shell grab can, of course, also be fitted on whereby the crane can be used for loading material or dredging sand or gravel.

Standard steam cranes, too, can be employed in a similar way as floating cranes for waterway conservancy. Fig. 4 shows a standard DEMAG steam crane on a rather unusual kind of job, namely that of clearing a river almost completely blocked with weeds, silt and ooze. This crane was set up temporarily on two caissons, each measuring 42.2 by 10.2 by 3.3-ft. The caissons were joined together by two powerful girders, on which the king journal, the lantern gear and the roller path of the crane are fastened with suitable bracings. The two caissons can be easily accommodated on a railway truck in the event of the crane having to be conveyed overland to another working site. The grab is a standard DEMAG grab with teeth screwed on to the lips of the shells, so that they can even penetrate easily into natural soil and are eminently suitable for dealing with oozy and muddy soil. When the grab is to be used for other purposes, such as loading coal for instance, all that has to be done is simply to remove the teeth. The illustration gives a very good idea of how the crane has cleared a way for itself along the river which was almost completely blocked with weeds.

The floating steam crane (Fig. 5) is equipped with a new type of grab which has already rendered splendid service in dredging work. This grab—called the "Polyp" on account of its peculiar shape and method of working—has, as opposed to the usual clam-shell grab, eight well bent shells which, with their points, naturally penetrate more easily and deeper into the soil or heap of stones than the two lips or the two parallel rows of teeth on the clam-shell grabs. As the shells can give sideways a little and the entire bottom block of the grab can lie aslant to the top block, the entire grab, when taking hold of large stone blocks of irregular shape, adapts itself to the shape of the block, so that even large blocks of 3-ft. 4-in. in length from edge to edge and over 20 cwt. in weight are securely held by a small "Polyp" (Fig. 6).

The Execution of Hulutao Harbor Works

(Continued from page 332)

skill from the part of the divers, but also a certain visibility. Submarine lamps are useful for night work when the water is clear but not even by day in case of silt particles suspended in it, as happens very often after storms in the comparatively shallow Liaotung gulf.

On a fine quiet day twelve blocks can easily be set, but the monthly production is very much reduced in consequence of the above-mentioned phenomena.

Block setting operations are still carried on during the latter part of November and every effort is made to extend the 500-ft. of quaywall constructed during the season 1931.

Behind the greater part of this length rubble backfilling has been deposited to increase the stability of this most exposed portion of the quaywall, which will serve later on as breakwater.

This first stretch of 500-ft. of quaywall could meet an urgent need as the port of Newchwang is closed during winter. It can accommodate steamers drafting not over 27-ft. for loading and discharging. The second working season is almost terminated and as a whole results are satisfactory.

As far as weather conditions do not permit actual work during winter, the winter season will be devoted to repairing and general

overhauling of the numerous engines and machines, as well as of the floating plant which will be partly laid up.

The completion of the harbor will require another four years of construction; but in consideration of the contemplated inauguration for use of the limited quay-accommodation which the works already executed up-to-date can provide, general satisfaction will be felt that one of the most noteworthy undertakings recently embarked upon in this country is being carried on with full force in spite of the political turmoil.

French Station Regains Lead

For a number of years the power station in the French Concession, Shanghai, has, by periodic additions to its generating plant, maintained a position as the highest powered oil-engined generating station in the world, until some months ago, when its output was exceeded by the 35,000 b.h.p. station at Vernon (California). Recently, the Shanghai Company has placed an order with Sulzer Bros. for an engine to develop 11,400 b.h.p. normal, 13,100 b.h.p. maximum output. When this engine is installed the Shanghai station will regain its lead with a continuous service rating of 42,600 b.h.p. and a peak load capacity of over 50,000 b.h.p. The new engine will be of the double-acting two-stroke type, with eight cylinders, 760 mm. bore by 1,200 mm. stroke, and will give its rated output at 136 r.p.m. The design generally will be similar to the 10,800 b.h.p. Sulzer engine which has been on peak load service for some months at Fribourg, in Switzerland, and during a considerable part of the time has carried its rated load for six to twelve hours a day owing to the water shortage at the hydro-electric plant. The present plant in Shanghai consists of two 1,500 b.h.p. and one 3,600 b.h.p. engines installed before 1924, one 3,600 b.h.p. set installed in 1925, one 5,250 b.h.p. set installed in 1928, one similar set put into service in 1929, and two further sets of the same size installed in 1931. All eight engines are of the Sulzer single-acting, two-stroke type, and are direct-coupled to fly-wheel type alternators. The company has also a Diesel engine pumping station at Tungkadoo, Shanghai, with three 750 b.h.p. four-stroke Sulzer engines.

Aerial Developments in Japan

The opening of new air routes, improvement of existing air ports and opening of new air ports enter largely into the plans of the Ministry of Communications in its program for the relief of the unemployed. The Ministry is seeking an appropriation of Y.25,000,000 covering a period of five years.

The Ministry's program includes the opening of an air line between Tokyo and Sapporo in Hokkaido, the building and improvement of airfield facilities in Tokyo and Fukuoka, a subsidy plan to encourage the breaking up of old ships and the building of new ones, and the laying of underground telephone and telegraph lines.

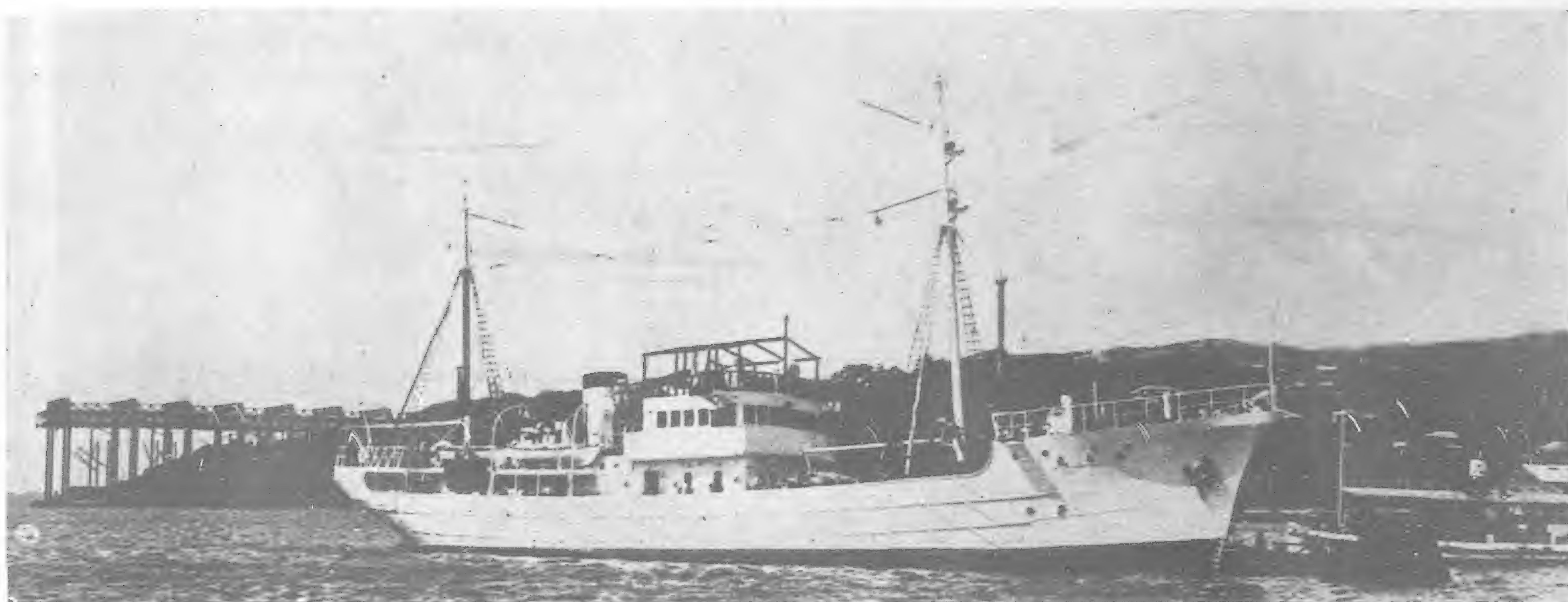
For the new air line plan, the Communications Ministry is going to expend Y.7,000,000 during the three-year period in building a 160,000 *tsubo* airfield each at Sendai, Aomori and Sapporo, employing the spare labor of local farmers.

The building and improvement of airfield equipment in Tokyo and Fukuoka will cost Y.3,000,000 during the three-year-period, according to the estimates of the Communications Ministry.

The Haneda air port of Tokyo covers an area of 160,000 *tsubo*, but so far only 50,000 *tsubo* of it has been prepared for service. The remaining 110,000 *tsubo* will be made available for service by the new plan at an estimated cost of Y.500,000.

Further Fukuoka will have a new airfield for land planes in addition to its air port for sea planes, according to this program of the Communications Ministry. The new Fukuoka airfield will be opened on the Najima beach, a small island off Fukuoka, side by side with the present air port for sea planes. The new airfield will cover an area of 160,000 *tsubo*.

On completion of the new Fukuoka airfield, those civil planes now accommodated at the military airfield at Tachiarai, will be provided with regular air port facilities there.



Diesel Electric Ship "Shonan Maru"

The Diesel Electric Ship "Shonan Maru"

Modern Fisheries Investigation Craft for Government of Formosa Equipped with Mitsubishi-Vickers Diesel and Auxiliary Diesel Electric Propelling Machinery

THIS vessel has been built in the Mitsubishi Nagasaki Shipyard to the order of the Government of Formosa, for the exploration of new fishing zones near Formosa, in China Sea and in the South Seas, as well as for experiment and research in connection with fisheries, fishing methods, oceanology and hydrobiology.

In view of the wide scope of experiments and investigations, the equipment is of very complicated nature, including trawling, line-fishing, drift-seining and other fishing appliances, refrigerating and cold storage, cannery installation, complete oceanological and oceanographical apparatus whilst special auxiliary Diesel-electric propulsion has been adopted, by which the vessel can be freely manoeuvred at a dead slow speed during line-fishing operation, this system being unique in the world and first introduced by the Mitsubishi Shipbuilding and Engineering Company in co-operation with the Mitsubishi Electric Engineering Company to meet the special requirements for a dead slow speed in line-fishing operation.

The leading particulars are as follows:—

Length between perpendiculars	.. ..	46.00 meters
Breadth moulded	.. ..	8.30 "
Depth moulded	.. ..	4.40 "
Load draught	.. ..	3.79 "
"Tween deck height, forecastle	.. ..	2.00 "
ditto poop	.. ..	2.05 "
Gross tonnage	.. ..	418 tons
Total S.H.P...	.. ..	680
Trial speed	.. ..	12.209 knots.
Service speed	.. ..	10.5 "

The vessel has been constructed in compliance with the Shipbuilding Regulations of the Japanese Ministry of Communications as well as with special reference to Lloyd's Rules, and is classified by the former as a "First-class Fishing Vessel."

General Arrangement and Hull Construction

In view of the duties imposed, the vessel has been constructed with special precautions for seaworthiness, easy manoeuvring and comfortable habitability in a tropical climate.

Exhaustive ship's model experiments were carried out in the builders' experimental tank at Nagasaki, referring to five different

models and corresponding model propellers, and the best form was finally decided after the owners' approval.

The vessel has an exceptionally smart and pleasing appearance, like that of a cruising yacht, with a raked funnel and masts, a clipper stem and an elliptical stern, the hull being painted snow-white. There are a continuous upper deck, a forecastle and a poop, whilst the deck housing extends from the front of the poop to amidships and over which are a wheel-house, a chart room and a captain's room. A compass platform is arranged over the bridge deck and is installed with a standard compass, a 2-meter range finder, a 24-in. searchlight projector, a radio direction finder, etc. Partial second decks are constructed below fore and aft parts of the upper deck. The forward lower deck is for the crew's accommodation, whilst the aft one is for the officers' and engineers' dining-saloon, a purser's room, a first engineer's room, a spare room, etc.

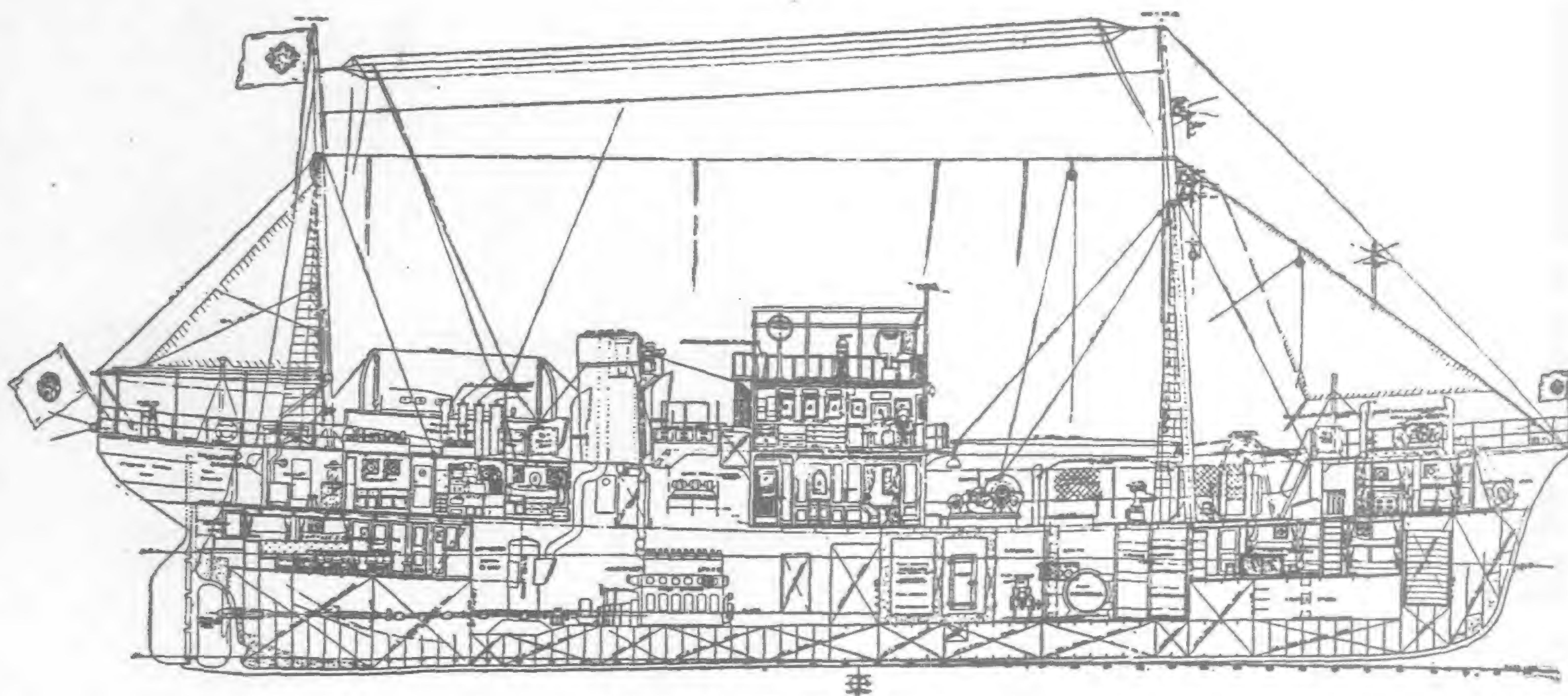
The engine room casing divides the deck house into two quarters, the forward one being arranged as a special suite including an investigator's room and a supervisor's room, whilst the aft quarter is for a chief engineer's room, a first officer's room, a wireless telegraphy room, a laboratory, a servants' room and galley. In rough weather, the fore and aft quarters are connected by a passage through doors provided at the fore and aft casing walls.

In the poop are a steering gear room at center, an ice room and coal bunker at portside, a vegetable room and a combined bath and photography room on the starboard side.

On the upper deck forward are a 75 h.p. electric trawl winch, a line hauler, a fish boiler, a gallow and a foremast. The forecastle is equipped with eight beds, a mess table, a bath-room and lavatory, a lamp room, a boatswain's store, etc., and is connected with a ladder to the lower crew's space where a well-insulated rice store is also situated.

Under the upper deck are three refrigerating chambers, a spacious canning shop, fishing implement stores, general stores, etc., to which a hatchway of 1.68 meters square is provided.

Special care has been taken for the structural design of the ship. A bar keel and a clipper stem with fashion plate are adopted. Stern post and shaft brackets have stream line sections to avoid eddy-making resistance, and also a double plated stream-line-shaped rudder is fitted. Floor plates are not used in the bottom fuel oil tanks and fresh water tanks, but frame bars and reverse frames only are used, which are connected by struts and brackets for the increase of capacities and the reduction of weight. The



General Arrangement (Profile)

most careful workmanship was applied to the structural connection under the engines to ensure rigidity and to minimise vibration.

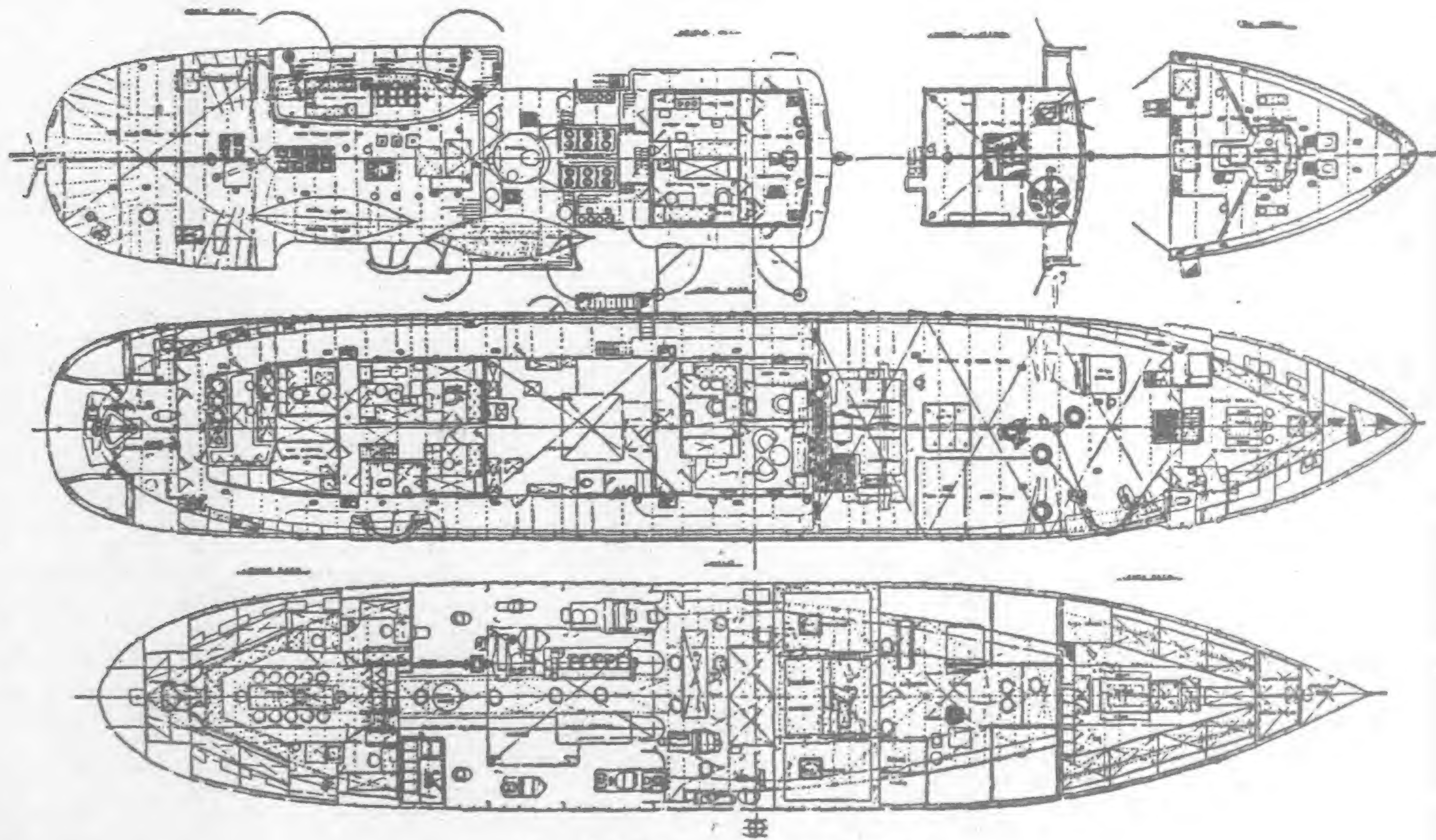
Upper deck beams are fitted to every alternate frame. The deck house top is of steel plating stiffened by beams with a spacing smaller than that of the upper deck, in view of supporting heavy loads such as boats, etc., and also of preventing vibration due to light structural arrangement. The poop deck is also covered with steel plating, the beams being fitted to every alternate frame.

It should not be overlooked that electric welding was specially applied to watertight transverse bulkheads and deep tank bulkheads, in which bulkhead plates were butt-welded whilst stiffeners of flat bars were tack-welded to the plating. Also the outside plating and frames at the whole stern counter were electrically welded in the same manner.

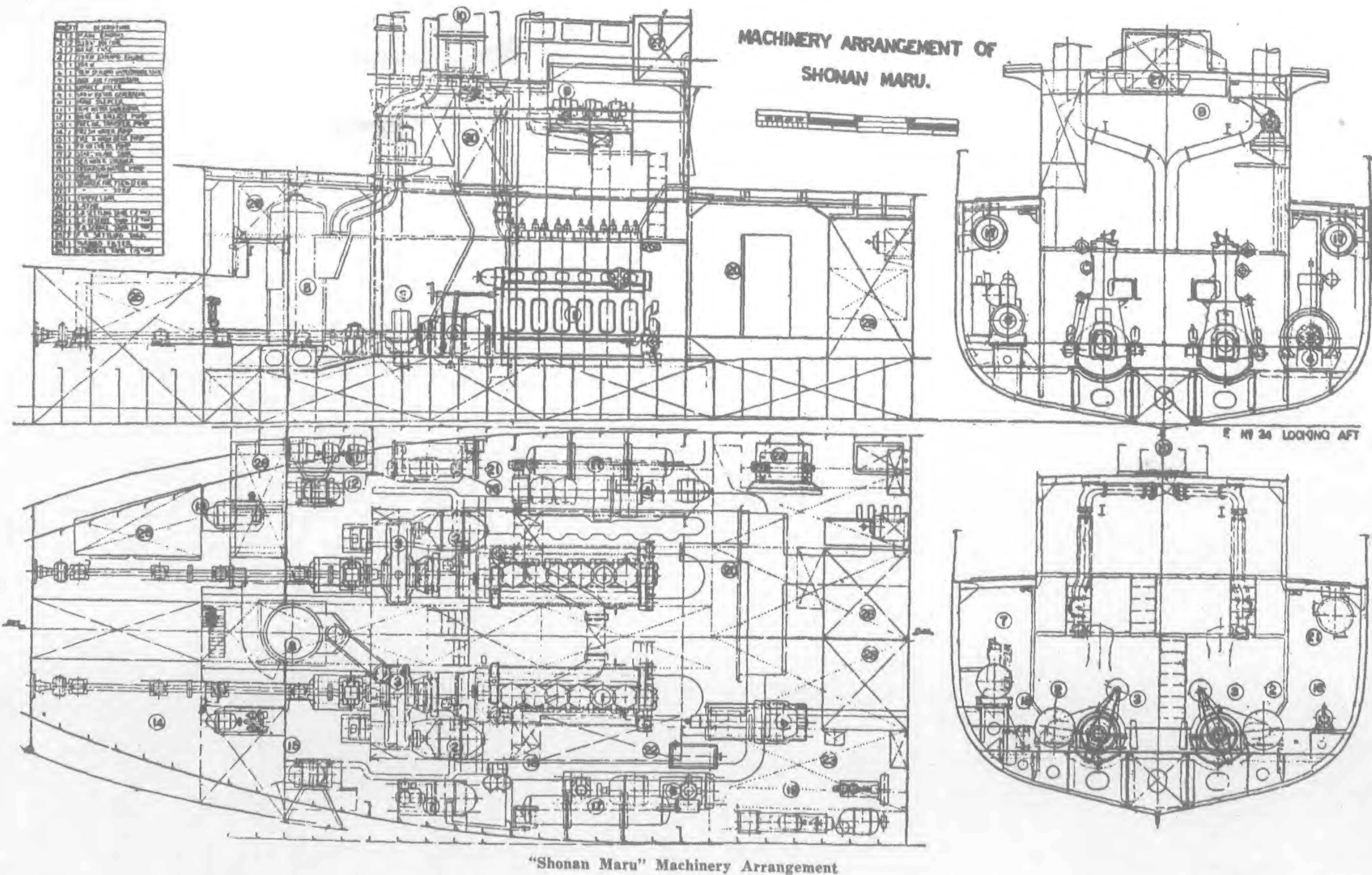
The outside plating is well protected by half-round steel bars, particularly the upper part of portside bilge keel being fitted with semi-circular steel bars throughout the length of the ship, for protection during trawling operations. Further, bulwark frames are reinforced by increasing the number and thickness for the handling of otter boards. For the prevention of corrosion, the steel plating of floors and walls of bath-rooms and lavatories, etc. is galvanized up to a height of 90 cms. from the floor surface.

Accommodation

The vessel being operated in the tropics, special care has been taken for the insulation of heat. Exposed parts of deck house casings and tops as well as the wheel-house and passages



General Arrangement (Finished Plan)



are lined inside with cork boards of 5 cm. thick, and also a special color scheme has been adopted for the inside painting of the living rooms so as to give a cooling sensation to occupants. Walls are mainly of polished oak, whilst furniture and upholstery are carefully selected for the ease and comfort of occupants.

En Suite rooms and wheel-house have special features. The former is situated in the front part of the deck house and comprises a drawing-room and a bed-sitting room, decorated in the William-and-Mary style, which matches in elegance and comfort suites of a first class passenger liner. The walls and furniture are of grain walnut of fine French polish decorated with smoked golden leaves, while all fittings are of smoked white metal. Luxurious easy chairs, sofas, sideboard and a decorative mirror with a large golden frame, etc. are provided, the floor being covered with fine carpet over rubber flooring. The upholstery lining is of special Japanese "Nishijin" silk tapestry as a specimen of the Japanese fine arts, whilst a special British-made spring mattress of Marshal type is used for the sofa bed. The rooms are fitted with decorative electric lamps, fans, radio repeater, etc. and rectangular brass-framed windows are also fitted.

The supervisor's room and higher officer's rooms have walls panelled with lacquered polished oak, and floors covered with rubber flooring or linoleum, fitted with a wash stand with running water, an automatic relay telephone, an electric heater, etc.

The dining-saloon has walls panelled with oak of fine grain, sofas and chairs lined with Morocco leather, a decorative sideboard with a large mirror, a skylight with beautiful stained-glass, while the flooring is of rubber. A special service lift is provided for the transportation of foods from the galley to pantry.

Navigation, Communication and Oceanographical Appliances

The equipment is unparalleled in this class of vessels, and almost all details are easily controllable either in the wheel-house or in the chart room.

There are two compasses of Navy pattern, two engine telegraphs with double dials, a Sal log with trip counter and speed indicator, a Walker's electric patent "Trident" log, an electric sounding machine, a Siemens' electric helm indicator of dry cell



Main Engines—Two Sets Mitsubishi-Vickers Four-Cycle Airless Injection Trunk Piston Diesel Engines with Six Cylinders each developing normally 340 b.h.p. at 275 r.p.m.

type, Negretti and Zambra's electric distance thermometers and sea water recording mercury thermometers, four Negretti and Zambra's tank gauges of pressure, type, three "Laringaphones," 12 Siemens' interphones, a 2-Meter Barr and Stroud's range finder, a 24-in. searchlight projector with electric remote control, a Marconi's direction finder, a 500 watt wireless telegraphy apparatus, a five valve radio set, etc.

As to the oceanographical and hydrobiological apparatus for the investigation of shoals' movements, the variation of sea water temperatures and the alteration of tidal current, etc., a Marukawa's depth finder, two Ekman's current meters, four Kitahara's surface plankton nets, Forel's water color standard scales, Akanuma's hydrometers, an echo-sounding machine and various other scientific instruments are completely provided.

Cold Storage and Refrigerating Appliances

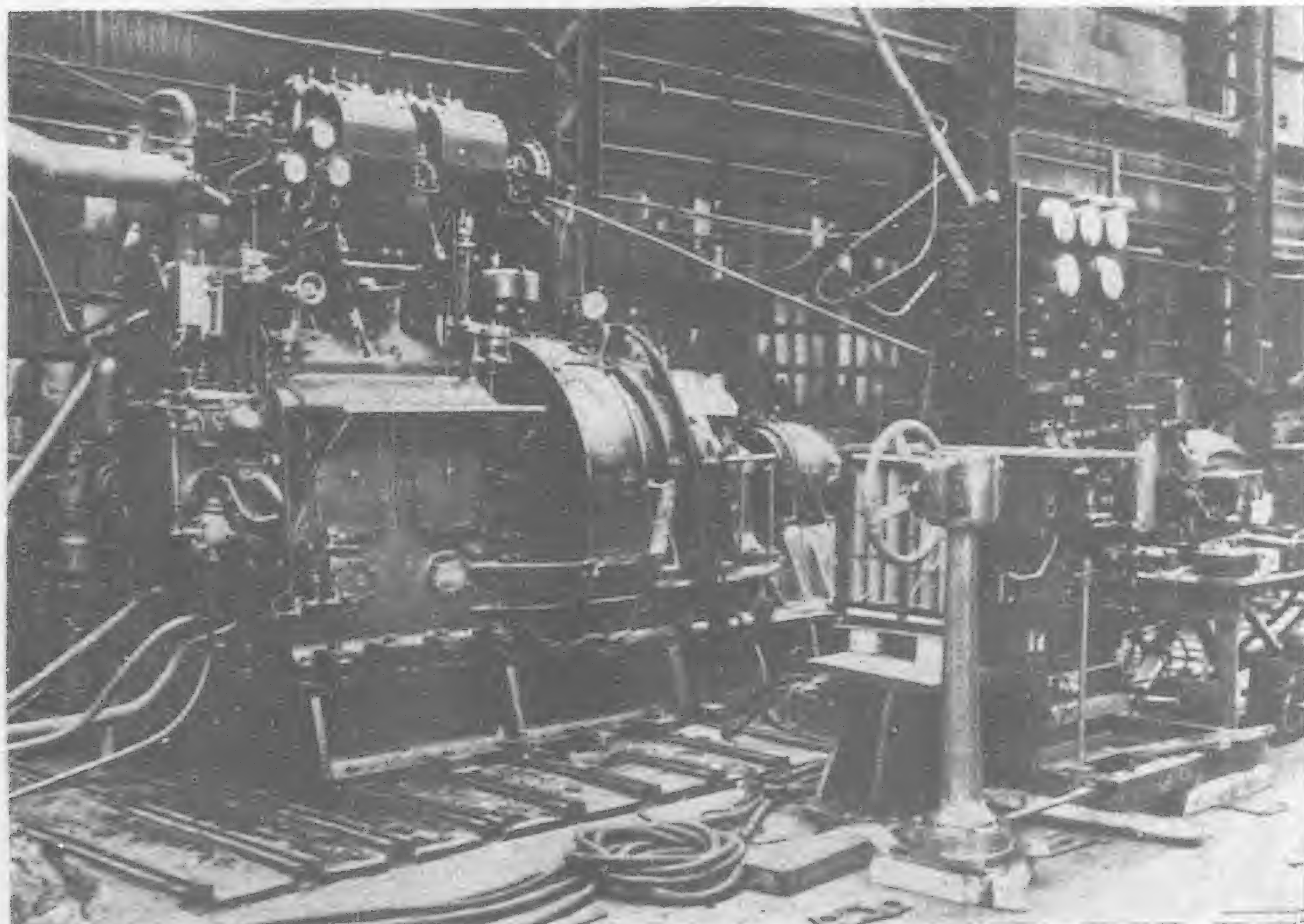
The refrigerating machine is of the ammonia compressive direct expansion type supplied by the York Ice Machinery Co. of the U.S.A. and has a capacity of 300,000 calories per day, the compressor being of Y-28 two cylinder type driven by a Mitsubishi 10 h.p. motor. The circulating pump is of Inokuty's centrifugal type made by the Ebara Engineering Works, whilst the ammonia receiver, condenser, etc., were supplied by the Chuo Refrigerating Company.

The machine cools the following chambers through manifold valves fitted to the front wall of the refrigerating machinery room:—

Name	Volume, cb. M.	Test temperature, C°.
Lobby	9.2	- 7
Refrigerating chamber ..	8.4	-30
Cold chamber, port ..	14.5	-18
Ditto starboard ..	14.3	-18

Door fittings of these chambers are of the latest Jamison's automatic shutter type, and also the dissipation of heat through drain wells, etc., is well prevented.

For heat insulation, three layers of cork plates of 7.5 cm. thick are mostly used and spaces are filled with granulated cork lined with American pine planks. Further, cement, asphalt, asphalt



Auxiliary Engine on Test Bed

mortar, oil paper, etc., are used to ensure the water and air tightness, and all surfaces of cork boards were immersed in molten asphalt.

For the temperature measurement of the cold chambers Negretti and Zambra's distance thermometers, automatic temperature recorders, ordinary thermometers, etc., are fitted. Further, steel construction of these rooms was water-tested by flooding water up to the upper deck height.

Canning Plant

The canning plant is situated below the upper deck on the front of the cold stores, where a fish disinfecter, a fish cutting machine, a rolling and tightening machine, vacuum pumps, fish flesh washers, shelves, built-up tables, etc., are completely installed.

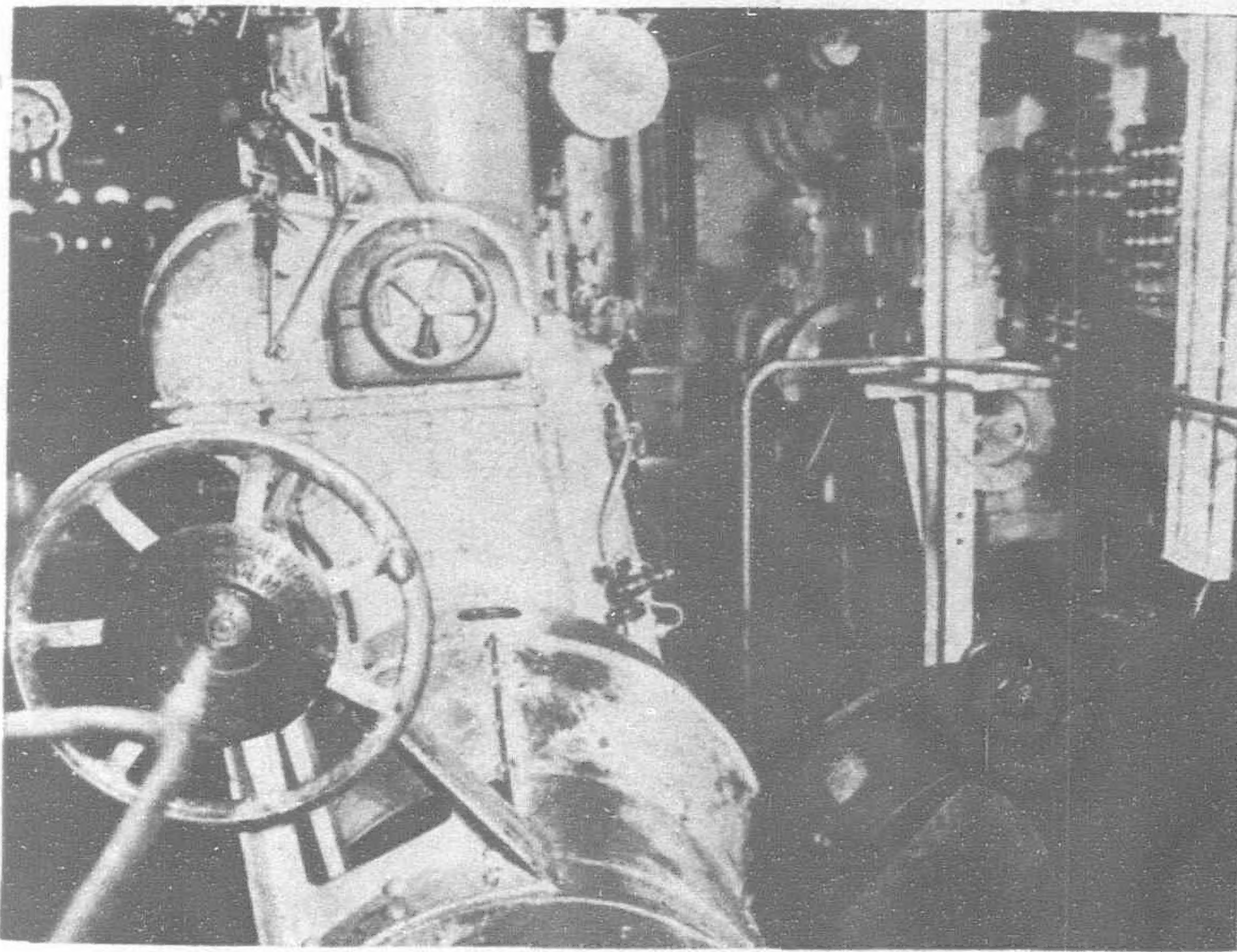
The rolling and tightening machine is of an automatic vacuum type fitted with a 3 kw. electric motor, vacuum pumps, tanks, etc., and has a capacity of canning $\frac{1}{2}$ -lb. tins from 10 to 15 in number per minute at a vacuum of 51 cm.

On the upper deck portside is a large fish boiler of a diam. 137 cm. and a length 137 cm., which is of a steam blow-in type at a normal working pressure of 2.2 kgs. per sq. cm. The fish disinfecter in the canning shop is of the same size and construction, provided with the latest Tycos temperature regulator, retort car, transporter, rails, etc.

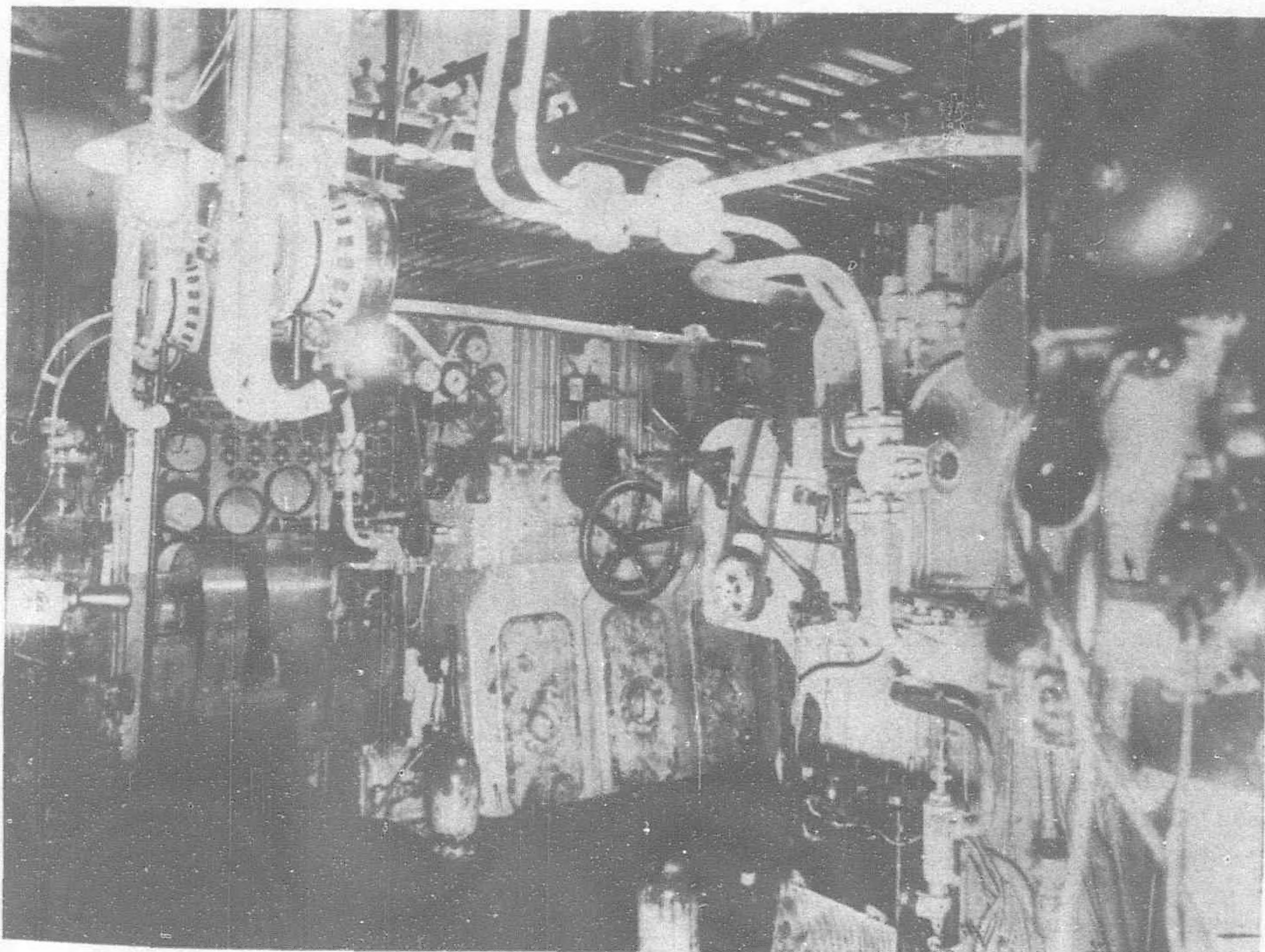
Fishing Appliances

Two strong gallows at starboard side, two latest type otter boards, a powerful trawl winch, a line hauler, rollers, seines, lines and ropes, etc., are completely provided for the trawling, line fishing and other fishing purposes.

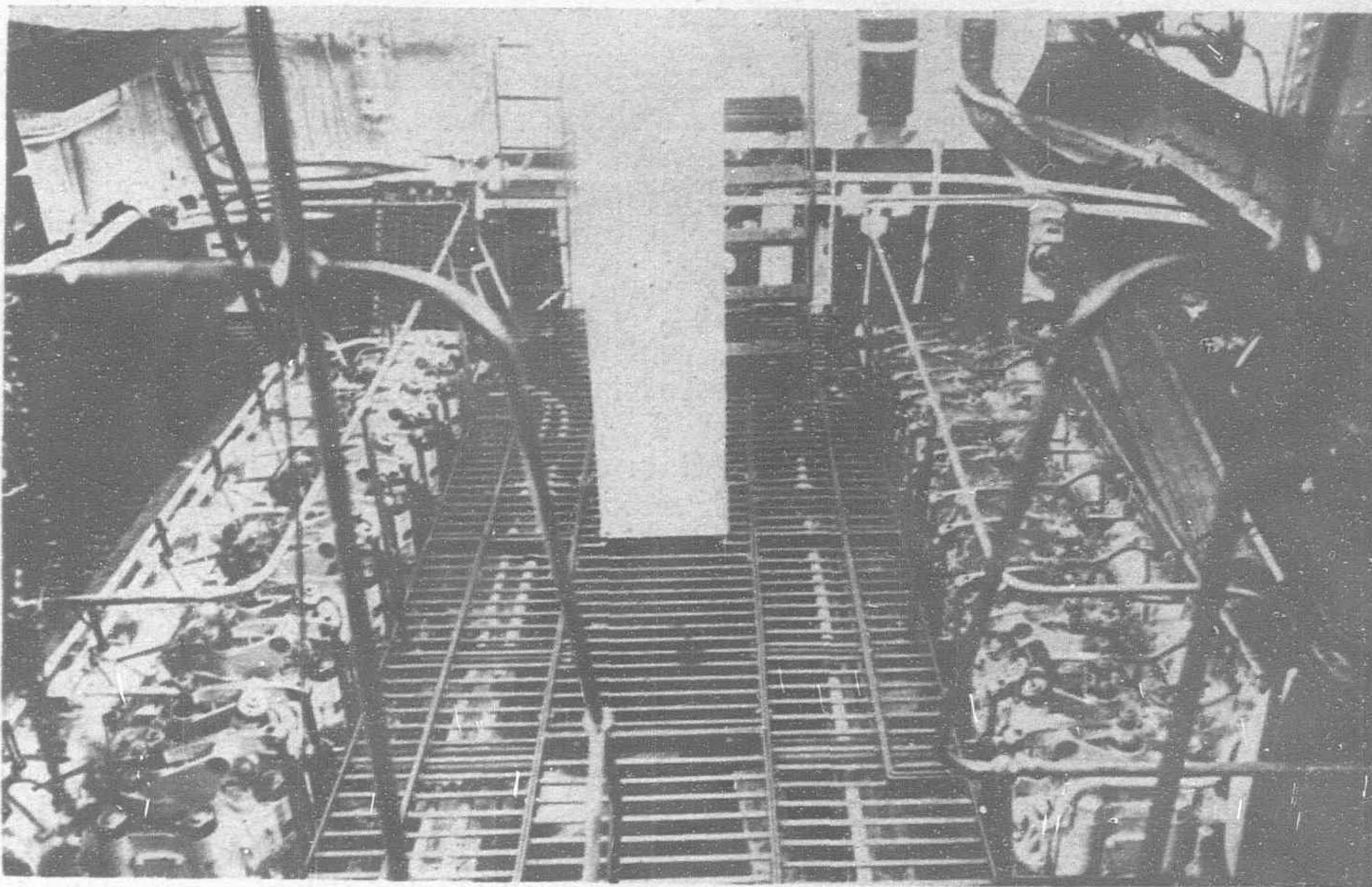
The trawl winch is of the Mitsubishi electric worm and spur gear type driven by a 55 kw.



Aft End of Main Engine and Propulsion Motor (Starboard)



Forward Ends of Main Engine



Top of the Main Engine

motor at 500 r.p.m. fitted with a controller of contactor type. The machine has a capacity of hauling 5.5 tons at 120-ft. per min. and is also utilized for derricking and warping purposes.

The line hauler is of Fujita's F.3 type driven by a 5 h.p. electric motor, and has a capacity of 400 lb. at 320-ft. per min. Center rollers, side rollers and all other necessary gears for the line hauling, etc., are fitted in vicinity of the foremast. The poop deck is very spacious for carrying out various fishing operations.

Miscellaneous Arrangements

The life-saving appliances comprise one 7.7 meter motor life-boat and two 6.06 meter stern boats of very light construction. The motorboat is equipped with a 30 h.p. Ikegai light-alloy petroleum engine and a speed of 10.28 knots was attained on trial, a folding hood and comfortable spring seats being fitted to the cockpit and a head light to the front.

The windlass is of an electric worm and spur gear type with a drum type controller and is driven by a 20 h.p. Mitsubishi motor at 1,000 r.p.m., the hauling capacity being four tons at 30-ft. per min. The machine was supplied by the Harima Shipbuilding and Engineering Company. The bower anchors are of stockless type supplied by the Kobe Steel Works, weighing 1,500 lb. each, and cables are $1\frac{1}{4}$ -in. in diam. manufactured by the Osaka Chain Works, Ltd.

The steering gear is of Atlas Werke's electric type controlled by the Ward-Leonard system, with a special aximeter pillar on the navigation bridge and a rudder watcher in the steering gear room.

The vessel is ventilated under natural system, whilst twenty-five 12-in. bracket fans and one 24-in. ceiling fan are also fitted to private and public rooms. All heaters are of electric type of various capacities from $\frac{1}{2}$ kw. to 3 kw. There are also 144 electric lamp fittings including two 750 watt fishing lamps.

Propelling Machinery

The propelling machinery comprises the main Diesel installation and the auxiliary electric propelling machinery.

The main engines are two sets of the Mitsubishi-Vickers four-cycle airless-injection trunk-piston Diesel engines with six cylinders of 275 mm. in bore and 565 mm. in stroke, each developing normally 340 b.h.p. or 240 kw. at 275 r.p.m.

The distribution of fuel to the cylinders is executed by fuel valve mechanically operated by cams, whilst fuel pumps serve only to deliver fuel oil to a common pressure oil main; consequently, the adjustment of the output of each fuel oil pump is not necessarily uniform, and in case of trouble in a certain cylinder, the rest of cylinders can conveniently develop their maximum output.

The shape of combustion chambers and the direction of injection have been selected after many years' experience and continuous research as to ensure the highest efficiency. Further, the cylinders being cast in one block, the construction is quite robust. Fuel pumps, circulating water pumps, bilge pumps, lubricating oil pumps and other direct-driven pumps being fitted to the forward end of the engines, the inspection is very easy and the arrangement is self-contained.

During line-fishing operations, a dead slow speed of the ship is very necessary, and even the lowest engine speed in the direct drive has been still too high. In this consideration, the vessel is equipped with the auxiliary electric propelling installation, which is used for a very slow speed only, say less than three knots, by disengaging the main engines from the propeller shafts.

The auxiliary propulsion motors have an output of 55 kw. each, and can be controlled within a range of 115-1,150 r.p.m. at a variable voltage system and drive the same propeller shafts as for the main engines through reduction gearings, by which the revolution of propellers can be freely regulated between 165 and 16 r.p.m. to meet the dead slow requirement.

The main engine and the auxiliary electric propelling machinery are independently coupled to the propeller shaft by a friction clutch which enables the auxiliary propelling machinery to connect with the propeller shaft, whilst the main engine is simultaneously disconnected from the shaft, and *vice versa*. It being so constructed that the main engine and the propulsion motor can be alternately disengaged at will by means of a single handle, the operation is simple and easy. Further, it is very convenient that the machinery is freely reversible and easily changeable in the speed.

There are two electric generators; one has an output of 75 kw. for supplying current mainly to the propelling motors and is driven by a two cylinder, four-cycle Mitsubishi-Vickers airless-injection Diesel of 120 b.h.p. at 500 r.p.m., whilst the other is of 30 kw. mainly for the general electric power and lighting, and is directly coupled to a three cylinder four-cycle airless-injection Diesel engine of 48 b.h.p. at 650 r.p.m.

The 75 kw. generator can be operated either in a constant voltage or at variable voltage. In a constant voltage, it can be driven in parallel with the 30 kw. generator. When the generator is to supply current to the propulsion motors, it is operated at variable voltage, which being freely controllable in a range between 225-volts and 22-volts, positive or negative, and also the direction of current can be altered at will, so that the number and direction of revolutions of the propelling motors can be freely altered.

In order to ensure such control, the handles at both sides of the wheel-house are so ingeniously made as to control the connection of the propelling motor to the electric circuit as well as the voltage by means of such handles only. Consequently, the ship's speed and the revolutions of propellers can be freely altered while inspecting whole fishing operations on the navigation bridge.

It should not be overlooked that this system is more advantageous in its economy and upkeep than the usual all Diesel-electric propulsion system or the direct Diesel drive. In the ordinary Diesel-electric system, the electrical and mechanical loss of somewhat high percentage has to be sustained in the main Diesels and propulsion motors at all speeds, besides there is a considerable increase of the initial cost, whilst in the usual direct Diesel propulsion economical diadvantages exist in driving large powered main engines at a very low power for a long duration together with the frequent cleaning of cylinders due to imperfect combustion, and if the ship's inertia is utilized for a very low speed by stopping engines very often, the wear of clutches and the consumption of starting and reversing air will be hopelessly tremendous.

In the present system, however, the extra initial cost is only for the propulsion motors, clutches and reduction gears. The generator being used for the windlass, winch, trawl gears, etc., there is no extra expense necessary on this line.

Thus, the vessel can be operated with full efficiency of the direct Diesel drive at higher speeds and with the utmost advantage of electrical propulsion at a low speed. Therefore, the present new system may be considered as the most economical and efficient method of propulsion for the particular purpose of the vessel and may bring a revolution in the future design and construction of the fishing craft.

Auxiliary Machinery

Apart from those stated before, the following auxiliary machinery are installed in the engine room:—

- One—7 kw. semi-Diesel engine directly coupled to a dynamo and an air compressor.
- One—Mitsubishi-Sulzer starting air compressor with a capacity of 80 cb. m. at 42 atms. driven by a 25 h.p. electric motor.
- Two—600 litre air reservoirs at 42 atms.
- One—20 cb. m. fuel oil transfer pump of electric spur gear type.
- Two—Fuel oil and lubricating oil service pumps of 3 cb. m. each, of electric spur gear type.
- One—Otto Meyer's fuel oil filter of "Turbulo" type.
- One—25 ton ballast pump of electric vertical plunger type.
- One—25 ton fire pump of the same type.
- One—Auxiliary boiler of Cochran type with a diam. of 1,070 mm. and a height of 2,900 mm. at a normal working pressure of 60 lb. per sq. in.
- One—650 kg. feed water pump of Worthington type.
- One—Complete set of fuel oil burning apparatus of Corona type.
- One—Silencer of cylindrical flap valve type with a volume of 1.2 cub. m.
- One—"Tyfone" whistle.
- One—Motor syren, etc.

All the pumps were manufactured by the Mitsubishi Nagasaki Works and the electric motor were supplied by the Mitsubishi Electrical Engineering Co., Ltd.

PROPELLERS.—The propellers are of four-bladed solid type with a diam. of 1,770 mm., a pitch of 1,360 mm. and a developed area of 1.1 sq. m. The material is special sea-water resisting nickel-bronze, named "N. M. Bronze" invented by the Mitsubishi Nagasaki Works.

Results of Shop Tests and Sea Trials

(a) *Shop Tests of Main Engines and Auxiliary Electric Propelling Machinery.*—One set of the main engines was directly coupled to a hydraulic dynamometer and was tested for five hours at $\frac{3}{4}$ load, 20 hours at full load, two hours at 10% overload and two more hours at 20% overload, whilst the other set was connected to the hydraulic dynamometer through clutch and the same tests were carried out. The fuel consumption at full power was recorded as 172 grams per b.h.p. per hour.

Two sets of the generators were tested for five hours at full load, and after having driven them in parallel, current was supplied to propulsion motors from the 75 kw. generator, and also tests for the clutches and for the control of motors were carried out. Further, tests for connecting auxiliary propulsion motors were executed by connecting the 75 kw. generator to the bridge control device under the same arrangement as on board and by means of a handle the lowest revolution of the propeller shaft was reduced to 16 r.p.m. and was able to alter the revolution as desired, whilst the reversing operation and disconnection from the propulsion motor to the main engine were very quickly executed under the most satisfactory performance.

A summary of test results is given below:—

Load. (Starboard Engine).		12/10	11/10	10/10	3/4
B.H.P.	...	410.9	379.0	342.4	256.8
R.P.M.	...	293.7	286.6	276.9	251.5
Maximum combustion pressure, kg./sq. cm.		43.4	42.8	42.3	40.0
Exhaust temperature, C.		426	392	345	264
Fuel consumption, gr./b.h.p./hour		178	174	172	173

(Port Engine).

B.H.P.	407.0	377.9	343.2	259.5
R.P.M.	291.3	286.4	277.5	254.1
Maxm. combn. press. kg./sq. cm.	42.5	40.5	40.4	38.0
Exhaust temp., C.	421	367	349	285
Fuel consumption, gr./b.h.p./hour	180	175	175	177

(b). *Sea Trials*.—Various sea trials were carried out off the entrance to Nagasaki Harbor under the following programme:—

First Day.—Progressive trials, and tests for Sal log, sounding machines, anchoring, steering, turning circles, range-finder, windlass, helm indicator, etc.

Second Day.—Official full power trial, continuous running trial, slow speed trials, manoeuvring trial, and tests for Sal log, range-finder, torsional vibration of shaftings, etc.

Third Day.—Electric propulsion trials, and tests for line hauler, trawling gears, automatic sea water temperature recorder, plankton machines, etc.

In the progressive trial, the engines were tested at various loads from one-fourth of the normal output to 124% overload. In the full power official trial, a mean speed of 12.209 knots was attained with a total output of 844 b.h.p. at 308.9 r.p.m. In the continuous running trial, the engines were driven for seven hours at 704 b.h.p. (total) and 287 r.p.m. (mean), the mean fuel consumption was measured as 171.5 grams per b.h.p. per hour.

In the electric propulsion trials, the portside engine was used, the maximum r.p.m. of the propeller shaft of 157.2, the minimum r.p.m. of 11, and a speed of 0.7 knot at the minimum r.p.m. and, 5.1 knots. at Max. were obtained.

No critical torsional vibration appeared within the range of the engine revolutions, and also the vibration of the ship was quite negligible throughout the trials.

The summary of trial results of the Diesel propulsion and the electric propulsion and a graph are given below:—

SEA TRIAL RESULT OF "SHONAN MARU" (DIESEL PROPULSION).

Date	August 25th, 1931					August 28th, 1931					
Mean draught in M.	..	3.125					3.258				
Displacement kg. ton	..	614.4					649.7				
Place of trial	Off Miye, Nagasaki. (1 mile post)									
Kind of trial	Progressive trial					Full power	7 hours			Slowest	
							Official	con-	tinuous		
Load	3/4	1/2	1/4		4/4	124%	4/4	5%		
Weather condition	Fine cloudy					Fine				
Sea condition..	Slight with long swell					Slight				
Direction and strength of wind		NE 3-4					NW 3				
Ship speed in kts.	11.583	10.692	9.091		11.807	12.209	—	4.323		
Mean propeller r.p.m.	281.0	247.7	205.9		290.7	308.9	287.0	99.7		
Aggregate i.h.p.	821.0	585.0	376.0		903	1028.0	867	106		
Aggregate b.h.p.	663.0	450.0	256.0		736	844	704	37		
Fuel pressure in kg/cm ²	400	353	335		400	448	394	240		
Dynamo engine output in kw.	6.6	6.6	6.6		14.3	14.3	11.7	5.5		
Fuel consumption in gr/-b.h.p./hr.	—	—	—		—	—	171.5	—		

SEA TRIAL RESULT OF "SHONAN MARU" (ELECTRIC PROPULSION).

Date	Aug. 29th, 1931							
Mean draught	3.245 in m.							
Displacement in kg. ton	645.5 kg. ton.							
Propulsive motor used	Port							
Place of trial	Off Miye, Nagasaki							
Weather condition	b.c.							
Sea condition	Smooth							
Direction and strength of wind	NE-3							
Manoeuvring handle notch	110	95	85	75	35	28		
Ship speed in kts.	5.1	4.2	3.4	2.9	1.3	0.7		
Propeller r.p.m.	157.2	131.4	107.1	90.0	29.4	11		
Propulsive motor								
Input kw.	63.0	35.1	19.1	13.6	1.7	0.7		
Output kw.	56.5	30.7	15.7	10.9	1.0	0.4		
b.h.p.	76.8	41.8	21.4	14.8	1.4	0.5		
Output per cent.	102.7	55.8	28.6	19.8	1.8	0.7		
Generator								
Volt	225	195	159	136	48	18		
Amp.	280	180	120	100	35	40		
R.P.M.	507	530	520	530	510	530		
Exciter								
Volt	217	223	225	225	225	225		
Amp.	12.0	9.8	8.5	7.8	6.2	6.2		

Development of the Port of Colombo

(Continued from page 333)

varying between 36 feet and 33 feet and 147 acres to between 33 feet and 30 feet; the remaining 208 acres have a depth of less than 30 feet. Berthing accommodation, exclusive of the graving-dock guide pier and the oil jetties, is available for 36 vessels during the northeast monsoon, and 23—or, using packed berths, 40—vessels during the southwest monsoon. Six berths are available at all times for vessels drawing up to 33 feet of water, one of which may be used by vessels of unlimited length.

Lightering, Docks and Warehousing

All cargo at Colombo is loaded and discharged by lighters. The quays and jetties used by the lighters and launches have a total length of 15,657 feet. There are 12 electric cranes, 30 steam cranes, 14 hand cranes, one elephant hand crane, one hand derrick, one steam derrick, and one mobile crane operating on the jetties and quays. The largest lift that can be made is 35 tons.

There is ample warehouse accommodation (592,476 square feet) along the harbor front for dealing with imports, exports and transshipments. Most of the warehouses have railway facilities, and cranes are available where required.

The patent slip at Colombo is 800 feet long. The length of the cradle is 220 feet and breadth 40 feet; depth over keel blocks at lower end at low water, 21 feet 6 inches; depth over keel block at upper end at low water, 10 feet 6 inches; and inclination, one in 20. It is capable of slipping a vessel of 1,200 tons deadweight.

The graving dock has a floor length of 700 feet. The breadth of entrance, cope level, is 85 feet; depth over sill at low water, 30 feet; depth over sill at high water, 32 feet. Docking can be carried out by day or night, as there is a modern electric installation at the dock.

Sources of Port Revenues

The harbor is administered by a port commission, which obtains its revenue as follows:

Revenue of Colombo port

In rupees, exchanging at about \$0.26

Item	1930	1931
Port dues	3,322,311	3,097,951
Lake-to-harbor dues	26,201	24,178
Warehouse rents	790,415	671,946
Other rents	389,639	364,557
Pilotage	290,351	281,770
Railway traffic	47,503	50,423
Other port collections	174,473	120,572
Revenue on oil installation	730,670	778,376

The port commission plans to spend 3,085,000 rupees (about \$802,100) during 1932 for dredging, necessary warehouse repairs, and other "maintenance" undertakings. Because of the necessity to economize, no new work of major size will be undertaken during the year.

However, the port commission is looking to the future when larger ships will be able to use the Suez Canal, thus making it necessary to increase the accommodations at Colombo, for further development of the port depends largely on the size of ships which will be permitted to pass through the Suez Canal in the future. The port authorities plan always to keep the capacity of the port a little ahead of the canal, thus assuring the continued importance of Colombo as a port of call.

An oil depot at Kolonnawa, 3½ miles inland, covers an area of more than 90 acres. Pipe lines connect it with the harbor at Colombo where three reinforced concrete jetties—two for bunkering purposes and one for discharge of oil tankers—have been provided.

The outer oil-bunkering jetty can accommodate vessels of 500 feet length drawing 27 feet of water; the inner bunkering jetty is used by barges for bunkering. Vessels of 500 feet length and 27 feet draft can be berthed at the discharge jetty, where the latest facilities for discharging oil ships are available.

Engineering Notes

INDUSTRIAL

PROJECT IN SZECHUAN.—In pursuance of a scheme of the Chinese Government to establish a steel works in Szechuan, investigations are now being conducted by experts despatched from Nanking to report on the coal and iron producing areas of the province. The project, though still in a preliminary stage, is nevertheless regarded with great interest both by Government leaders and industrialists as it is intended to aid the development of the vast mineral resources for which Szechuan is famous.—*Kuo Min.*

PHONES IN CEYLON.—On the subject of the proposal by Imperial and International Communications, Ltd., to take over the Ceylon Government Telephone system, Mr. Brand, Manager of the Colombo branch of the Eastern Telegraph Co. said he was authorized to issue the following statement for publication:—"The Imperial and International Communications, Ltd., has proposed to the Government of Ceylon, through the Minister of Communications and Works, the formation of a Ceylonese company, with a capital of rupees ten million, for the purpose of exploiting and developing the telephone system of Ceylon under the authority of the Government."

RAILWAYS

S.M.R. IMPROVEMENTS.—The South Manchurian Railway has a program of new works involving expenditure of £12,000,000 over the next three years, and arrangements are being made for an increase in capital to finance the scheme.—*Eastern Engineering and Commerce.*

DEVELOPMENT OF POSHAN.—To facilitate transportation of coal, the Kiaochow-Tsinan Railway has decided to purchase the light railway from Poshan, estimated at from \$900,000 to \$1,200,000. It is planned to establish an electric plant at Poshan to develop industries along the line.

RAILWAY IN SZECHWAN.—Preliminary survey for the Chengtu-Chungking Railway has been completed, the cost of construction being estimated at \$24,000,000. This railway will be of great commercial and strategic importance, as it will link up Chengtu, the provincial capital of Szechwan, with Chungking, on the Yangtze. For a distance of slightly over 300 miles the projected line will pass through a fertile region which is at present partly served by a highway. Starting from Chengtu, the railway will parallel the Chengtu-Chungking highway to Neikiang. At this city the railway will continue south to Lungchang and Shaochiufang before turning north-eastward to Yungchang. From Yungchang it will again run parallel with the highway to Yungchuan, thence to Chungking.—*Eastern Engineering and Commerce.*

CANTON - HANKOW RAILWAY.—By order of the Nanking Ministry of Railways, a monthly appropriation of \$100,000 is to be granted to the Canton-Shiuchow Railway Administration (which is the southern section of the Canton-Hankow Railway) specially for the purpose of completing that section of the Canton-Hankow Railway. The Canton-Shiuchow Railway Administration has been undertaking engineering operations on this last link between Chuchow, in central Hunan, and Shiuchow, Kwangtung. Owing to poor business conditions, however, the Administration is now unable to meet the construction expenses, which are estimated at \$100,000 per month, and has applied to the Ministry for aid. As the completion of the Canton-Hankow Railway is one of the more urgent measures in the Ministry's program, the Ministry is anxious that construction work should not be suspended.—*Kuo Min.*

ELECTRICAL

JAPANESE CABLES.—The Sumitomo Cable Co. of Osaka, which belongs to the copper group of the same name, has commenced the erection of an extensive cable factory which, it is claimed, will be able to cover most of the cable requirements of Japan.

OPPOSES ENTERPRISE.—In an appeal to the Executive and Control Yuans, in Nanking, the Chinese Electric Operators' Guild, expressing opposition to the reported proposal for the establishment in Hangchow of an electric company with the help of a loan from Americans, requests the Government not to grant the permission for the proposed electric enterprise in Hangchow.

IN PHILIPPINES.—The Legislature of the Philippines has approved measures to install, operate and maintain electric light, heat and power plants in the Municipalities of Pontevedra (Occidental Negros), Gerona and Pura (Tarlac), Ramos (Tarlac), Bacoor (Cavite), Apalit, Macabebe, Masantol, San Simon and San Luis (Pampanga), and Tangub (Occidental Misamis), Philippine Islands. An Act granting to Davao Telephone Co. a franchise to install, operate and maintain a telephone system in the Province of Davao and any municipality or municipalities thereof has also been approved.—*Eastern Engineering and Commerce.*

COMMUNICATIONS

TELEPHONES FOR JAPAN.—The installation of new telephones at the rate of 23,000 per year is being planned by the Japanese Ministry of Communications.

ROAD WORK IN CHINA.—Early completion of the Tihua-Hsinghsinghsia section of the Kansu-Sinkiang National Highway has been ordered by the Chinese Ministry of Railways. This section covers about 315 miles, part of which has been already completed. The Ministry has also issued an order to the Suiyuan Reconstruction Department for the early construction of the Pingtichuan-Pangkiang highway of about 150 miles, an important artery in the proposed network of communications in the north-west. Chekiang Reconstruction Department has decided to complete eight highways during the present year.

HONGKONG TELEPHONES.—At the seventh meeting of the Hongkong Telephone Co. the chairman indicated the extension, in the near future, of the service in the New Territories. He also said that the Canton-Hongkong service was much in demand and that the success of the project was assured. To meet orders for installations the company has laid down during the past year 3,293,426 circuit miles of underground cables and covered distribution. There must, said the chairman, be very few telephone administrations, where such a large percentage of the subscribers' lines was served entirely by underground cables.—*Eastern Engineering and Commerce.*

COMMUNICATIONS ROADS IN CHINA.—It is reported that the proposal calling for the appropriation of \$10 million from the Boxer Indemnity Refund as a loan to the Kiangsi Provincial Government for the construction of motor highways in that province has received the official sanction of the Central Authorities. The project, which was proposed by General Hsiung Shih-hui, Chairman of the Kiangsi Provincial Government, provides for the building of trunk lines connecting the important cities of Kiangsi with the provinces of Chekiang, Fukien and Kwangtung, so as to facilitate communications and, at the same time, assist in the anti-Red campaign.

JAPANESE AIRPORTS.—Partially as a relief measure for the unemployed, the Imperial Aviation Society of Japan has decided to launch a movement for the construction of 200 air ports throughout the country. Officials of the Aviation Society claim that such a program would not only contribute to the alleviation of the unemployment situation, but would also aid the progress of civilian aviation, besides being of great value in strengthening Japan's military defences.

SHIPPING

NEW SHIPYARDS.—The greatest ship-building yards in the U.S.S.R. are now under construction in Habarovsk. All the necessary material for the work has been brought to the site and about 4,000 workers and 100 engineers and technicians are now active on the job.—*Tass Agency.*

PROPOSED NEW HARBOR.—A survey has been made of the proposed harbor at the mouth of the Hangchow River, planned by the Chinese Reconstruction Commission. The site is only about 60 miles from Shanghai. There are two prosperous towns near, Kanpu and Chapu, and there are channels in Hangchow Bay, from 24 to 30 feet in depth but there is no railway, nor are there any deep water channels for vessels carrying freight for and from points in the interior. According to plans laid down by Dr. Sun Yat-sen, the construction of the "Great Eastern" harbor should be undertaken simultaneously with the building of a south-eastern railway system and the improvement of the waterways south of the Yangtze for carrying freight to and from inland points.—*Eastern Engineering and Commerce.*

NEW SUNGARI WHARF.—The Harbin Chamber of Commerce, the Binchang Transportation Association, and the Chambers of Commerce of various districts along the Sungari and Heilungkiang Rivers, realizing the need of a new wharf in the Binchang district, have leased land, and petitioned the Administration for approval of the scheme. This will be the third wharf in Binchang.

MINING

YUNNAN TIN EXPORTS.—Exports of tin from Yunnan in the third quarter of last year amounted to 29,252 piculs, making the total for the nine months 81,965 piculs, or 4,878 tons, as against 80,546 piculs, or 4,794 tons for the same period of 1930.

GOLD IN THE F.M.S.—In the Batang Padang district of Perak, where gold is generally won in the course of working tin ore, the tendency has been for the rate of output to decrease. The following are particulars of past and recent production:—

	1931	1931	1932
	Total	Av. p. month.	March.
	oz.		oz.
Raub Aust. Gold Mines	24,727	2,060	2,561
Batang Padang	2,294	191	109

The depressed state of the tin industry has naturally stimulated activities in relation to search for gold and a number of parties have gone prospecting in Pahang and Kelantan where, especially in the latter state, gold is known to occur in the mountainous country running northward into South Siam. It has recently been proposed to form a prospecting and development company with headquarters in Kuala Lumpur to investigate potential gold-bearing areas in this peninsula and in the Dutch East Indies. The proposed capital to be authorized is \$1,000,000 of which \$100,000 would be called up.